QAPP Worksheet #11 (continued)
Project Quality Objectives/Systematic Planning Process Statements

HOW MUCH DATA ARE NEEDED?

A sufficient amount of data is collected to facilitate an evaluation of the performance and effectiveness of the implemented ECs in reducing or mitigating contamination at the Site. The number of samples and monitoring parameters are established in the SMP Monitoring Plan.

WHEN WILL THE DATA BE COLLECTED?

The data are collected on a semi-annual basis.

WHO WILL COLLECT AND GENERATE THE DATA?

Severn Trent Environmental Services (STES) collects the data and generates the field data (i.e., water-level measurements, field water quality parameters, and landfill gas monitoring data). EcoTest Laboratories generates the analytical data.

HOW WILL THE DATA BE REPORTED?

The data will be included in the annual Site Management Report.

HOW WILL THE DATA BE ARCHIVED?

All data will be archived by STES.

QAPP Worksheet #12-1
Measurement Performance Criteria Table

Matrix	Aqueous
Analytical Group	TCL VOCs
Concentration Level	All

Sampling Procedure[1]	Analytical Method/SOP[2]	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SMP-3	L-1	Precision-Overall	RPD < 20%	Field Duplicate	S&A
		Accuracy/Bias	%Recovery (%R) lab generated limits *	Surrogate	A
		Accuracy/Bias Contamination	< Reporting Limit (RL)	Blanks (Field, Trip, Equipment, Method)	S&A
		Accuracy/Bias	%R lab generated limit*	Laboratory control sample (LCS)	A
		Accuracy/Bias	% Relative Abundance See Analytical Method and SOP	Instrument Performance Check: Bromofluorobenzene (BFB)	A
		Precision	Area Response & Retention Times, See Analytical SOP	Internal Standard	A
		Accuracy/Bias	%R lab generated limit*	Matrix or Blank Spike (MS)	A
		Accuracy/Bias	%R lab generated limit*	Matrix or Blank Spike Duplicate (MSD) or Laboratory Control Sample Duplicate (LCSD)	A
		Precision	RPD lab generated limit*	MS/MSD or LCS/LCSD	A

[1]Reference number from QAPP Worksheet #21.
[2]Reference number from QAPP Worksheet #23.
* See Attachment 2
TCL – USEPA Contract Laboratory Program Target Compound List for OLM03.2

QAPP Worksheet #12-2
Measurement Performance Criteria Table

Matrix	Aqueous
Analytical Group	TCL SVOCs
Concentration Level	All

Sampling Procedure[1]	Analytical Method/SOP[2]	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SMP-3	L-2	Precision-Overall	RPD < 20%	Field Duplicate	S&A
		Accuracy/Bias	%Recovery (%R) lab generated limits *	Surrogate	A
		Accuracy/Bias Contamination	< Reporting Limit (RL)	Blanks (Field, Equipment, Method)	S&A
		Accuracy/Bias	%R lab generated limits*	Laboratory control sample (LCS)/ Laboratory Control Sample Duplicate (LCSD)	A
		Accuracy/Bias	% Relative Abundance See Analytical Method and SOP	Instrument Performance Check: DFTPP	A
		Precision	Area Response & Retention Times, See Analytical Method and SOP	Internal Standard	A
		Accuracy/Bias	%R lab generated limits*	Matrix or Blank Spike (MS) / Matrix or Blank Spike Duplicate (MSD)	A
		Precision	%RPD lab generated limits*	MS/MSD or LCS/LCSD	A

[1]Reference number from QAPP Worksheet #21.
[2]Reference number from QAPP Worksheet #23.
*See Attachment 2
TCL – USEPA Contract Laboratory Program Target Compound List for OLM03.2

QAPP Worksheet #12-3
Measurement Performance Criteria Table

Matrix	Aqueous
Analytical Group	TAL Metals
Concentration Level	All

Sampling Procedure[1]	Analytical Method/SOP[2]	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SMP-3	L-4 L-5	Precision-Overall	RPD < 40%	Field Duplicate	S&A
		Accuracy/Bias Contamination	< Reporting Limit (RL)	Blanks (Field, Equipment, Calibration, Prep.)	S&A
		Accuracy/Bias	%R (90-110)	Initial and Continuing calibration verification	A
		Precision-lab	Certain metals (%R (80-120) See Analytical Method and SOP	Interference check sample (A and AB)	A
		Accuracy/Bias	%R lab generated limit*	Matrix Spike (MS)/ Matrix Spike Duplicate (MSD)	A
		Precision	RPD lab generated limit*	MS/MSD	A
		Accuracy/Bias	%R lab generated limit*	Laboratory control sample (LCS) / Laboratory Control Sample Duplicate (LCSD)	A
		Accuracy/Bias	%R (75-125)	Post digestion spike	A
		Precision	%Difference (%D) < 10%	Serial dilution [3]	A

[1]Reference number from QAPP Worksheet #21.
[2]Reference number from QAPP Worksheet #23.
[3]Performed as needed only for analytes with concentration > 50-times the MDL.
* See Attachment 2

QAPP Worksheet #12-4
Measurement Performance Criteria Table

Matrix	Aqueous
Analytical Group	General Chemistry Parameters
Concentration Level	All

Sampling Procedure[1]	Analytical Method/SOP[2]	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SMP-3	L-6 L-7 L-8 L-9 L-10 L-11 L-12 L-13 L-14	Precision-Overall	RPD < 20%	Field Duplicate	S&A
		Precision-lab	RPD lab generated limits*	Laboratory Duplicate	A
		Accuracy/Bias Contamination	< Reporting Limit (RL)	Blanks (Field, Equipment, Calibration, Prep.)	S&A
		Accuracy/Bias	See Analytical Method and SOP	Continuing calibration verification	A
		Accuracy/Bias	%R lab generated limit*	Matrix or Blank Spike (MS)/ Matrix or Blank Spike Duplicate (MSD)	A
		Accuracy/Bias	%R lab generated limit*	Laboratory control sample (LCS)/ or Laboratory Control Sample Duplicate (LCSD)	A
		Precision	%RPD lab generated limit*	MS/MSD or LCS/LCSD	A

[1]Reference number from QAPP Worksheet #21.
[2]Reference number from QAPP Worksheet #23.
* See Attachment 2

QAPP Worksheet #12-5
Measurement Performance Criteria Table

Matrix	Aqueous
Analytical Group	TCL Organochlorine Pesticides
Concentration Level	All

Sampling Procedure[1]	Analytical Method/SOP[2]	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SMP-3	L-3	Precision-Overall	RPD < 20%	Field Duplicate	S&A
		Accuracy/Bias	%Recovery (%R) lab generated limits*	Surrogate	A
		Accuracy/Bias Contamination	< Reporting Limit (RL)	Blanks (Field, Trip, Equipment, Method)	S&A
		Accuracy/Bias	%R lab generated limit*	Laboratory control sample (LCS) / Laboratory Control Sample Duplicate (LCSD)	A
		Accuracy/Bias	%Recovery (%R) lab generated limits*	Matrix or Blank Spike (MS)/ Matrix or Blank Spike Duplicate (MSD)	A
		Precision	RPD lab generated limits*	MS/MSD or LCS/LCSD	A
		Accuracy/Bias and Precision	Retention times, see analytical SOP	Retention time windows	A

[1]Reference number from QAPP Worksheet #21.
[2]Reference number from QAPP Worksheet #23.
* See Attachment 2

QAPP Worksheet #14
Summary of Project Tasks

Sampling Tasks:
1. Water-level measurements.
2. Groundwater sample collection.
3. Field water quality parameters (pH, conductivity, temperature, dissolved oxygen, oxidation-reduction potential, and turbidity).
4. Leachate sample collection.
5. Stormwater sample collection.
6. Gas monitoring well testing (% methane, % oxygen, and % carbon dioxide) and landfill surface gas monitoring (methane).

Analysis Tasks:
1. EcoTest Laboratories to prepare and analyze groundwater samples for TCL VOCs, TCL SVOCs, TCL pesticides, TAL inorganics, cyanide, and conventional leachate parameters.
2. EcoTest Laboratories to prepare and analyze leachate samples for TCL VOCs, TCL SVOCs, TCL pesticides, TAL inorganics, cyanide, and conventional leachate parameters.
3. EcoTest Laboratories to prepare and analyze storm water samples for TCL VOCs, TCL SVOCs, TCL pesticides, TAL inorganics, cyanide, and conventional leachate parameters.

Quality Control Tasks:
1. Implement sample collection, labeling, handling, and analysis procedures as described in the SMP and this QAPP. QC samples are described on Worksheet #20.

Data Management Tasks:
1. Analytical data will be managed in an electronic data management system after validation.

QAPP Worksheet #14 (continued)
Summary of Project Tasks

Documentation and Records:

1. **Field Documentation** – Field personnel will provide comprehensive documentation covering various aspects of field sampling, field analysis and sample chain of custody (COC). This documentation consists of a record that allows reconstruction of field events and sample handling to aid in the data review and interpretation process. Documents, records and information relating to the performance of the field work will be retained in the project file.

2. **Laboratory Project Files** – The laboratory will establish a file for pertinent data. The file will include correspondence, faxed information, phone logs and COC forms. The laboratory will retain project files and data packages for a period not less than 5 years. The laboratory will retain copies of the analytical data reports in office files or secure off-site storage.

3. **Laboratory Logbooks** – Workbooks, bench sheets, instrument logbooks and instrument printouts will be used to trace the history of samples through the analytical process and to document important aspects of the work, including the associated quality controls. As such, logbooks, bench sheets, instrument logs, and instrument printouts will be part of the permanent record of the laboratory. Each page or entry will be dated and initialed by the analyst at the time of entry. Errors in entry will be crossed out in indelible ink with one stroke, corrected without the use of white-out or by obliterating or writing directly over the erroneous entry, and initialed and dated by the individual making the correction. Pages of logbooks that are not used will be completed by lining out unused portions. Information regarding the sample, analytical procedures performed and results of the testing will be recorded on laboratory forms or personal notebook pages by the analyst. These notes will be dated and will also identify the analyst, instrument used and instrument conditions. Laboratory notebooks will be periodically reviewed by the laboratory group leaders for accuracy, completeness and compliance with this QAPP. All entries and calculations will be verified by the laboratory group leader. If all entries on the pages are correct, the laboratory group leader will initial and date the pages. Corrective action will be taken for incorrect entries before the laboratory group leader signs.

4. **Computer and hard copy storage** – All electronic files and deliverables will be retained for a period not less than 5 years; hard copy data packages (or electronic copies) will also be retained for a period not less than 5 years. STES and/or its designated representative will retain copies of the analytical data reports.

QAPP Worksheet #14 (continued)
Summary of Project Tasks

5. **Field Data Reporting –** Information collected in the field through visual observation, manual measurement and/or field instrumentation will be recorded in field notebooks or data sheets and/or on forms. Such data will be reviewed by the appropriate Field Program Manager for adherence to the SMP and for consistency. Concerns identified as a result of this review will be discussed with the field personnel, corrected if possible and (as necessary) incorporated into the data evaluation process. If applicable, field data forms and calculations will be processed and included in appendices to the appropriate reports (when generated). The original field logs documents, and data reductions will be kept in the project file.

6. **Laboratory data reporting –** Data reports for all parameters will include, at a minimum, the following items:

Summary of activities that took place during sample analysis, including the following information:

- laboratory name and address
- date of sample receipt
- cross reference of laboratory identification number to contractor sample identification
- analytical methods used
- deviations from specified protocol
- corrective actions taken
- Chain of custody form
- Sample receipt checklist

Analytical Results: These will be reported according to analysis type and include the following information, as applicable:

- sample identification (ID)
- laboratory ID
- date of collection
- date of receipt
- date of extraction
- date of analysis
- detection limits

Sample results on the report forms will be corrected for dilutions. All results will be reported uncorrected for blank contamination.

The Report Format will comply with NYSDEC Analytical Services Protocol (ASP) requirements.

QAPP Worksheet #14 (continued)
Summary of Project Tasks

Data Review Tasks:

1. EcoTest Laboratories will verify that data are complete and meet internal laboratory SOP QC criteria.
2. All laboratory data will undergo data verification/validation for completeness and technical compliance as appropriate.
3. Validated data will be managed in an electronic database, with any applicable qualifiers, and data tables for reports will be generated directly from the database.

QAPP Worksheet #15-1
Reference Limits and Evaluation Table

Matrix: Aqueous
Analytical Group: TCL VOCs
Concentration Level: All

Analyte[1]	CAS Number	Project Action Limit[2] (ug/L)	Laboratory Limits (ug/L)	
			MDLs	RLs
1,1,1-Trichloroethane	71-55-6	5	0.22	1
1,1,2,2-Tetrachloroethane	79-34-5	5	0.30	1
1,1,2-Trichloroethane	79-00-5	1	0.17	1
1,1-Dichloroethane	75-34-3	5	0.20	1
1,1-Dichloroethene	75-35-4	5	0.25	1
1,2-Dichloroethane	107-06-2	0.6	0.18	1
1,2-Dichloropropane	78-87-5	1	0.16	1
2-Butanone	78-93-3	50	1.77	10
2-Hexanone	591-78-6	50	0.96	10
4-Methyl-2-pentanone	108-10-1	NA	6.48	10
Acetone	67-64-1	50	1.84	10
Benzene	71-43-2	1	0.17	1
Bromodichloromethane	75-27-4	50	0.23	1
Bromoform	75-25-2	50	0.13	1
Bromomethane	74-83-9	5	0.52	1
Carbon disulfide	75-15-0	60	0.26	1
Carbon tetrachloride	56-23-5	5	0.61	1

QAPP Worksheet #15-1 (continued)
Reference Limits and Evaluation Table

Matrix: Aqueous
Analytical Group: TCL VOCs
Concentration Level: All

Analyte[1]	CAS Number	Project Action Limit[2] (ug/L)	Laboratory Limits	
			MDLs	RLs
Chlorobenzene	108-90-7	5	0.17	1
Chloroethane	75-00-3	5	0.12	1
Chloroform	67-66-3	7	0.23	1
Chloromethane	74-87-3	NA	0.76	1
1,2-Dichloroethene (total)	540-59-0	5	0.52[3]	2[3]
cis-1,3-Dichloropropene	10061-01-5	0.4	0.10	1
Dibromochloromethane	124-48-1	50	0.15	1
Ethylbenzene	100-41-4	5	0.19	1
Methylene Chloride	75-09-2	5	0.26	1
Xylenes (total)	1330-20-7	5	0.60[3]	3[3]
Styrene	100-42-5	5	0.14	1
Tetrachloroethene	127-18-4	5	0.16	1
Toluene	108-88-3	5	0.29	1
trans-1,3-Dichloropropene	10061-02-6	0.4	0.20	1
Trichloroethene	79-01-6	5	0.29	1
Vinyl chloride	75-01-4	2	0.39	1

NA – Action Limit not established
[1] Compound list is based on USEPA Contract Laboratory Program OLM03.2 Target Compound List.
[2] Project Action Limit is based on NYS Ambient Water Quality Standards and Guidance Values and apply only to the groundwater samples collected from monitoring wells. No Action Limits are established for the leachate and stormwater samples.
[3] Combination of isomers for MDLs and RLs.

QAPP Worksheet #15-2
Reference Limits and Evaluation Table

Matrix: Aqueous
Analytical Group: TCL SVOCs
Concentration Level: All

Analyte[1]	CAS Number	Project Action Limit[2] (ug/L)	Laboratory Limits	
			MDLs	RLs
1,2-Dichlorobenzene	95-50-1	3	0.56	1
1,2,4-Trichlorobenzene	120-82-1	5	0.63	1
1,3-Dichlorobenzene	541-73-1	3	0.50	1
1,4-Dichlorobenzene	106-46-7	3	0.52	1
2-Chloronaphthalene	91-58-7	10	0.77	1
2-Chlorophenol	95-57-8	1[3]	0.22	1
2-Methylnaphthalene	91-57-6	NA	0.72	1
2-Methylphenol	95-48-7	1[3]	0.46	1
2-Nitroaniline	88-74-4	5	0.62	1
2-Nitrophenol	88-75-5	1[3]	0.22	1
2,4-Dichlorophenol	120-83-2	5	0.28	1
2,4-Dimethylphenol	105-67-9	50	0.31	1
2,4-Dinitrophenol	51-28-5	10	0.18	10
2,4-Dinitrotoluene	121-14-2	5	0.62	1
2,4,5-Trichlorophenol	95-95-4	1[3]	0.24	1
2,4,6-Trichlorophenol	88-06-2	1[3]	0.25	1
2,6-Dinitrotoluene	606-20-2	5	0.78	1

QAPP Worksheet #15-2 (continued)
Reference Limits and Evaluation Table

Matrix: Aqueous
Analytical Group: TCL SVOCs
Concentration Level: All

Analyte[1]	Cas Number	Project Action Limit[2] (ug/L)	Laboratory Limits	
			MDLs	RLs
3-Nitroaniline	99-09-2	5	0.39	1
3,3'-Dichlorobenzidine	91-94-1	5	7.05	1
4-Bromophenyl-phenyl ether	101-55-3	NA	0.95	1
4-Chloro-3-methylphenol	59-50-7	1[3]	0.2	1
4-Chloroaniline	106-47-8	5	0.74	1
4-Chlorophenyl-phenylether	7005-72-3	NA	0.90	1
4-Methylphenol	106-44-5	1[3]	0.25	1
4-Nitroaniline	100-01-6	5	0.68	1
4-Nitrophenol	100-02-7	1[3]	0.18	10
4,6-Dinitro-2-methylphenol	543-52-1	1[3]	0.21	10
Acenaphthene	83-32-9	20	0.78	1
Acenaphthylene	208-96-8	NA	0.76	1
Anthracene	120-12-7	50	0.96	1
Benzo[a]anthracene	56-55-3	0.002	0.79	1
Benzo[a]pyrene	50-32-8	ND	0.92	1
Benzo[b]fluoranthene	205-99-2	0.002	0.93	1
Benzo[g,h,i]perylene	191-24-2	NA	0.76	1
Benzo[k]fluoranthene	207-08-9	0.002	0.92	1
Bis(2-chloroethoxy)methane	111-91-1	5	0.82	1

QAPP Worksheet #15-2 (continued)
Reference Limits and Evaluation Table

Matrix: Aqueous
Analytical Group: TCL SVOCs
Concentration Level: All

Analyte[1]	Cas Number	Project Action Limit[2] (ug/L)	Laboratory Limits	
			MDLs	RLs
Bis(2-chloroethyl)ether	111-44-4	1	0.92	1
Bis(2-chloroisopropyl)ether	108-60-1	5	0.92	1
Bis(2-ethylhexyl)phthalate	117-81-7	5	0.24	1
Butylbenzylphthalate	85-68-7	50	0.85	1
Carbazole	86-74-8	NA	0.83	1
Chrysene	218-01-9	0.002	0.77	1
Di-n-butylphthalate	84-74-2	50	0.95	1
Di-n-octylphthalate	117-84-0	50	0.86	1
Dibenz[a,h]anthracene	53-70-3	NA	0.75	1
Dibenzofuran	132-64-9	NA	0.81	1
Diethylphthalate	84-66-2	50	0.90	1
Dimethylphthalate	131-11-3	50	0.65	1
Fluoranthene	206-44-0	50	0.92	1
Fluorene	86-73-7	50	0.85	1
Hexachlorobenzene	118-74-1	0.04	0.97	1
Hexachlorobutadiene	87-68-3	0.5	0.67	1
Hexachlorocyclopentadiene	77-47-4	5	1.70	10
Hexachloroethane	67-72-1	5	2.5	1

QAPP Worksheet #15-2 (continued)
Reference Limits and Evaluation Table

Matrix: Aqueous
Analytical Group: TCL SVOCs
Concentration Level: All

Analyte[1]	Cas Number	Project Action Limit[2] (ug/L)	Laboratory Limits	
			MDLs	RLs
Indeno(1,2,3-cd)pyrene	193-39-5	0.002	0.79	1
Isophorone	78-59-1	50	0.75	1
N-Nitroso-di-n-propylamine	621-64-7	NA	0.67	1
N-Nitrosodiphenylamine	86-30-6	50	0.94	1
Naphthalene	91-20-3	10	0.66	1
Nitrobenzene	98-95-3	0.4	0.89	1
Pentachlorophenol	87-86-5	1[3]	0.27	10
Phenanthrene	85-01-8	50	0.95	1
Phenol	108-95-2	1[3]	0.32	1
Pyrene	129-00-0	50	0.88	1

NA – Action Limit not established
ND – Non Detect
[1] Compound list is based on USEPA Contract Laboratory Program OLM03.2 Target Compound List.
[2] Project Action Limit is based on NYS Ambient Water Quality Standards and Guidance Values and apply only to the groundwater samples collected from monitoring wells. No Action Limits are established for the leachate and stormwater samples.
[3] Applies to the sum of these substances.

QAPP Worksheet #15-3
Reference Limits and Evaluation Table

Matrix: Aqueous
Analytical Group:
TCL Organochlorine Pesticides
Concentration Level: All

Analyte[1]	Cas Number	Project Action Limit[2] (ug/L)	Laboratory Limits	
			MDLs	RLs
Aldrin	309-00-2	ND	0.005	0.05
alpha-BHC	319-84-6	0.01	0.004	0.05
beta-BHC	319-85-7	0.04	0.003	0.05
delta-BHC	319-86-8	0.04	0.004	0.05
gamma-BHC (Lindane)	58-89-9	0.05	0.002	0.05
Chlordane (n.o.s.)	57-74-9	0.05	0.06	0.2
alpha-Chlordane	5103-71-9	NA	NA	0.1
beta-Chlordane	5103-74-2	NA	NA	0.1
4,4'-DDD	72-54-8	0.3	0.003	0.05
4,4'-DDE	72-55-9	0.2	0.003	0.05
4,4'-DDT	50-29-3	0.2	0.004	0.1
Dieldrin	60-57-1	0.004	0.005	0.05
Endosulfan I	959-98-8	NA	0.003	0.1
Endosulfan II	33213-65-9	NA	0.004	0.1
Endosulfan sulfate	1031-07-8	NA	0.008	0.3
Endrin	72-20-8	ND	0.009	0.05
Endrin aldehyde	7421-93-4	5	0.009	0.3

QAPP Worksheet #15-3 (continued)
Reference Limits and Evaluation Table

Matrix: Aqueous
Analytical Group:
TCL Organochlorine Pesticides
Concentration Level: All

Analyte[1]	Cas Number	Project Action Limit[2] (ug/L)	Laboratory Limits	
			MDLs	RLs
Endrin ketone	53494-70-5	5	NA	0.1
Heptachlor	76-44-8	0.04	0.021	0.05
Heptachlor Epoxide	1024-57-3	0.03	0.003	0.05
Methoxychlor	72-43-5	35	0.007	0.1
Toxaphene	8001-35-2	0.06	NA	1

NA – Not Available or Action Limit not established
ND – Non Detect
[1] Compound list is based on USEPA Contract Laboratory Program OLM03.2 Target Compound List.
[2] Project Action Limit is based on NYS Ambient Water Quality Standards and Guidance Values and apply only to the groundwater samples collected from monitoring wells. No Action Limits are established for the leachate or stormwater samples.

QAPP Worksheet #15-4
Reference Limits and Evaluation Table

Matrix: Aqueous
Analytical Group: TAL Metals
Concentration Level: All

Analyte	CAS Number	Project Action Limit[1] (mg/L)	Laboratory Limits	
			MDL	RL
Aluminum	7429-90-5	NA	0.01255	0.01
Antimony	7440-36-0	0.003	0.00230	0.005
Arsenic	7440-38-2	0.025	0.00509	0.005
Barium	7440-39-3	1	0.00052	0.005
Beryllium	7440-41-7	0.003	0.00017	0.001
Cadmium	7440-43-9	0.005	0.00020	0.001
Calcium	7440-70-2	NA	0.04450	0.20
Chromium	7440-47-3	0.050	0.00262	0.005
Cobalt	7440-48-4	NA	0.00022	0.005
Copper	7440-50-8	0.200	0.00390	0.01
Iron	7439-89-6	0.300	0.03664	0.01
Lead	7439-92-1	0.025	0.00145	0.005
Magnesium	7439-95-4	35	0.01003	0.005
Manganese	7439-96-5	0.300	0.00096	0.01
Nickel	7440-02-0	0.100	0.00122	0.01
Potassium	7440-09-7	NA	0.00955	1.0
Selenium	7782-49-2	0.010	0.01473	0.01
Silver	7440-22-4	0.050	0.00050	0.005
Sodium	7440-23-5	20	0.30404	1.0
Thallium	7440-28-0	0.0005	0.00816	0.002
Vanadium	7440-62-2	NA	0.00024	0.005
Zinc	7440-66-6	2	0.00319	0.01

NA – Action Limit not established
[1] Project Action Limit is based on NYS Ambient Water Quality Standards and Guidance Values and apply only to the groundwater samples collected from monitoring wells. No Action Limits are established for the leachate and stormwater samples.

QAPP Worksheet #15-5
Reference Limits and Evaluation Table

Matrix: Aqueous
Analytical Group: Mercury
Concentration Level: All

Analyte	CAS Number	Project Action Limit[1] (mg/L)	Laboratory Limits	
			MDL	RL
Mercury	7439-97-6	0.0007	0.000088	0.00025

[1] Project Action Limit is based on NYS Ambient Water Quality Standards and Guidance Values and apply only to the groundwater samples collected from monitoring wells. No Action Limits are established for the leachate and stormwater samples.

QAPP Worksheet #15-6
Reference Limits and Evaluation Table

Matrix: Aqueous
Analytical Group: General Chemistry Parameters
Concentration Level: All

Analyte	CAS Number	Project Action Limit[1] (mg/L)	Laboratory Limits	
			MDL	RL
Cyanide	57-12-5	0.200	NA	0.02
Ammonia	7664-41-7	2	NA	0.2
Chloride	16887-00-6	250	NA	2
Nitrate	NA	10	NA	0.5
Sulfate	14808-79-8	250	NA	10
Total Dissolved Solids	NA	NA	NA	100
Alkalinity - Carbonate	NA	NA	NA	2
Alkalinity - Bicarbonate	NA	NA	NA	2
Chemical Oxygen Demand	NA	NA	NA	40
Total Kjeldahl Nitrogen	NA	NA	NA	0.2

NA – Not Applicable or Action Limit not established
[1] Project Action Limit is based on NYS Ambient Water Quality Standards and Guidance Values and apply only to the groundwater samples collected from monitoring wells. No Action Limits are established for the leachate and stormwater samples.

QAPP Worksheet #16
Project Schedule/Timeline Table

Activities	Organization	Dates		Deliverable	Deliverable Due Date
		Anticipated Date(s) of Initiation	Anticipated Date of Completion		
SMP and QAPP Preparation	ARCADIS	09/05/07	04/25/08	SMP and QAPP	04/28/08
Groundwater Sample, Leachate Sample, and Stormwater Sample Collection	STES	Semi-annual	Semi-annual	All Samples Submitted to Laboratory	Semi-annual
Laboratory Analysis	EcoTest Laboratories	Semi-annual	Semi-annual	Data Packages	Semi-annual
Data Review	To Be Determined	Semi-annual	Semi-annual	Data Validation Checklist	Semi-annual
Site Management Report Preparation	To Be Determined	Annual	Annual	Site Management Report	March 31 Annually

QAPP Worksheet #17
Sampling Design and Rationale

Groundwater samples, leachate samples, stormwater samples, and landfill gas samples are collected from the designated sample locations, and water-level measurements are collected from select monitoring wells and piezometers during the semi-annual sampling events. The data collected during the semi-annual events will facilitate a full evaluation of the performance and effectiveness of the implemented ECs in reducing or mitigating contamination at the Site. Additional detail regarding sample locations and monitoring parameters rationale is presented in the Site Management Plan.

All samples are either hand delivered or shipped on ice by overnight carrier to EcoTest Laboratories on the same day that the samples are collected following sample custody requirements. EcoTest Laboratories will be prepared to receive the samples and perform preliminary extractions or analyses within the analytical method recommended holding times.

QAPP Worksheet #18
Sampling Locations and Methods/SOP Requirements Table

Sampling Location/ID Number	Matrix	Depth (ft)	Analytical Group	Concentration Level	Number of Samples (identify field duplicates)	Sampling SOP Reference[1]	Rationale for Sampling Location
Monitoring Wells[2]	Aqueous	See SMP	Field Parameters, TCL VOCs, TCL SVOCs, TAL Metals, TCL OC Pesticides, Cyanide and Conventional Leachate Parameters[3]	All	10 plus 1 field duplicate sample	SMP-3	See Worksheet #17
Collection Sump No. D-1	Leachate	NA	TCL VOCs, TCL SVOCs, TAL Metals, TCL OC Pesticides, Cyanide and Conventional Leachate Parameters[3]	All	1	SMP-3	See Worksheet #17
SW-1	Aqueous	NA	TCL VOCs, TCL SVOCs, TAL Metals, TCL OC Pesticides, Cyanide and Conventional Leachate Parameters[3]	All	1	SMP-3	See Worksheet #17
Landfill Gas	Gas	NA	Methane, Oxygen, Carbon Dioxide	All	14	SMP-3	See Worksheet #17

[1] Sampling SOP References from SMP.
[2] Field Parameters for Monitoring Wells include dissolved oxygen, oxidation-reduction potential, temperature, turbidity, pH, conductivity.
[3] Conventional leachate parameters include ammonia, chloride, nitrate, sulfate, total dissolved solids, carbonate alkalinity, bicarbonate alkalinity, chemical oxygen demand, and total kjeldahl nitrogen.

QAPP Worksheet #19
Analytical SOP Requirements Table

Matrix	Analytical Group	Analytical and Preparation Method/SOP Reference[1]	Analytical Method	Containers (number, size, and type)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (collection to preparation/ analysis)
Aqueous	VOCs	L-1	SW 8260	3 x 40-mL VOA vials	pH < 2 with HCl, Cool 6° C	14 Days
Aqueous	SVOCs	L-2	SW 8270	2 x 1 L amber glass	Cool 6° C	7 Days to Extraction, 40 Days to Analysis
Aqueous	OC Pesticides	L-3	SW 8081	2 x 1 L amber glass	Cool 6° C	7 Days to Extraction, 40 Days to Analysis
Aqueous	Metals	L-4 L-5	EPA 200.7 & 245.1	1 x 500-mL HDPE	pH < 2 with HNO_3, Cool 4° C	6 Months, Mercury 28 Days
Aqueous	Cyanide	L-7	EPA 335.4	1 x 500-mL HDPE	pH > 12 with NaOH, Cool 6° C	14 Days
Aqueous	Ammonia	L-6	SM 4500-NH3 C & D	1 x 250 mL HDPE	pH < 2 with H_2SO_4 Cool 6° C	28 Days
Aqueous	Chloride	L-8	SM 4500-CL B	1 x 250 mL HDPE	Cool 6° C	28 Days
Aqueous	Nitrate	L-9	EPA 353.2	1 x 250 mL HDPE	Cool 6° C	48 Hours
Aqueous	Sulfate	L-10	ASTM D516-90, 02	1 x 250 mL HDPE	Cool 6° C	28 Days
Aqueous	Total Dissolved Solids	L-11	SM 2540 C	1 x 250 mL HDPE	Cool 6° C	7 Days
Aqueous	Alkalinity (Bicarbonate & Carbonate)	L-12	SM 2320 B	1 x 500 mL HDPE	Cool 6° C	14 Days
Aqueous	Chemical Oxygen Demand	L-13	EPA 410.1	1 x 250 mL HDPE	pH < 2 with H_2SO_4 Cool 6° C	28 Days
Aqueous	Total Kjeldahl Nitrogen	L-14	SM 4500 B	1 x 250 mL HDPE	pH < 2 with H_2SO_4 Cool 6° C	28 Days

[1]See Analytical SOP References table (Worksheet #23).

QAPP Worksheet #20
Field Quality Control Sample Summary Table

Matrix	Analytical Group	Concentration Level	Analytical and Preparation SOP Reference[1]	No. of Sampling Locations	No. of Field Duplicate Pairs	No. of MS Pairs	No. of Trip Blanks	No. of Equip. Blanks	Total No. of Samples to Lab
Aqueous	VOCs	All	L-1	12	1	1	1	1	16
Aqueous	SVOCs	All	L-2	12	1	1	0	1	15
Aqueous	OC Pesticides	All	L-3	12	1	1	0	1	15
Aqueous	Metals	All	L-4/L-5	12	1	1	0	1	15
Aqueous	Cyanide	All	L-7	12	1	1	0	1	15
Aqueous	Ammonia	All	L-6	12	1	1	0	1	15
Aqueous	Chloride	All	L-8	12	1	1	0	1	15
Aqueous	Nitrate	All	L-9	12	1	1	0	1	15
Aqueous	Sulfate	All	L-10	12	1	1	0	1	15
Aqueous	Total Dissolved Solids	All	L-11	12	1	1	0	NA	14
Aqueous	Alkalinity	All	L-12	12	1	1	0	NA	14
Aqueous	COD	All	L-13	12	1	1	0	NA	14
Aqueous	TKN	All	L-14	12	1	1	0	NA	14

[1] Analytical SOP References table (Worksheet #23). NA – Not Applicable

QAPP Worksheet #21
Field Project Sampling SOP References Table

Reference Number	Title, Revision Date and/or Number	Originating Organization	Equipment Type	Modified for Project Work? (Y/N)	Comments
SMP-3	SMP Monitoring Plan	ARCADIS	NA	Y	Includes descriptions and procedures for groundwater, leachate, and stormwater sample collection, landfill gas monitoring, required equipment, and equipment decontamination. Includes sample packaging, shipping, and chain-of-custody requirements.

QAPP Worksheet #22
Field Equipment Calibration, Maintenance, Testing, and Inspection Table

Instrument or Equipment	Description	Field Calibration Procedure	Performance Criteria	Responsible Personnel
pH, Conductivity, Temperature, Dissolved Oxygen, (DO), Oxidation-Reduction Potential (ORP) Meters	Meters designed for field use with battery operation.	Calibration of the meters and checking of the probes with standard solutions will be completed each day immediately prior to use in accordance with the manufacturer's recommendations. The probes should be rinsed with deionized water between each calibration solution or standard solution and following calibration. Used calibration solution is to be discarded.	pH +/- 0.01 S.U.	Sample Collection Personnel
			Conductivity at +/- 2% FSD.	
	Calibration verification	Calibrations will be verified at mid-day and at the end of the sampling day.	For pH, if the response is greater than $\pm$ 0.2 S.U. for pH, +/- 2% FSD for conductivity, or $\pm$10% difference for the other parameters from the standard, complete re-calibration will be conducted.	
Turbidimeter	Nephelometer designed for field use with battery operation.	Unit responsiveness will be checked prior to use each day with appropriate standards provided by the supplier and in accordance with the manufacturer's instructions.	+/- 10%	Sample Collection Personnel
Landfill Gas (LFG) Analyzer	LFG analyzer designed for field use with battery operation.	Calibration of the LFG analyzer will be completed each day immediately prior to use in accordance with the manufacturer's recommendations.	+/- 3%	Sample Collection Personnel
Organic Vapor Analyzer (OVA) or Flame Ionization Detector (FID)	OVA or FID designed for field use with battery operation.	Calibration of the OVA or FID will be completed each day immediately prior to use in accordance with the manufacturer's recommendations.	+/- 0.5 PPM	Sample Collection Personnel

[1]Sampling SOP References table – Worksheet #21.

QAPP Worksheet #23
Analytical SOP References Table

Reference Number	Title, Revision Date, and/or Number	Definitive or Screening Data	Analytical Group	Method Number	Instrument	Organization Performing Analysis	Modified for Project Work? (Y/N)
L-1	Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS); Version #2 Date: 6/11/03	Definitive	TCL VOCs	8260B	GC/MS	EcoTest Laboratories	N
L-2	Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS); Version #2 Date: 6/11/03	Definitive	TCL SVOCs	8270C	GC/MS	EcoTest Laboratories	N
L-3	Organochlorine Pesticides by Gas Chromatography; Version #2 Date: 7/10/03	Definitive	TCL Organochlorine Pesticides	8081A	GC/ECD	EcoTest Laboratories	N
L-4	Inductively Coupled Plasma Atomic Emission Spectrometric Method for Trace Element Analysis of Water, Wastes, and Air Samples; Version #3 Date: 9/13/05	Definitive	TAL Metals	200.7	ICP	EcoTest Laboratories	N
L-5	Cold-Vapor atomic absorption procedure for determining the concentration of mercury in Potable and Wastewater samples; Version #2 Date 6/11/03	Definitive	Mercury	245.1	CVAAS	EcoTest Laboratories	N
L-6	Nitrogen, Ammonia (Potentiometric, Ion Selective Electrode; Version #3 Date 10/19/07	Definitive	Ammonia	4500-NH3-D (97)	ISE	EcoTest Laboratories	N
L-7	Cyanide, Manual Distillation (4500-CN^- C) Followed by Semi-Automated Colorimetry (335.4); Version #2 Date June 28, 2003	Definitive	Cyanide	4500-CN^- C with 335.4	Distillation and Spectrophotometer	EcoTest Laboratories	N

QAPP Worksheet #23 (continued)
Analytical SOP References Table

Reference Number	Title, Revision Date, and/or Number	Definitive or Screening Data	Analytical Group	Method Number	Instrument	Organization Performing Analysis	Modified for Project Work? (Y/N)
L-8	Chloride, Argentometric Method; Version #2 Date: June 25, 2003	Definitive	Chloride	4500-CL⁻ B	Titration	EcoTest Laboratories	N
L-9	Determination of Nitrate-Nitrite Nitrogen by Automated Colorimetry; Version #2 Date July 11, 2003	Definitive	NItrate	353.2	Technicon Autoanalyzer	EcoTest Laboratories	N
L-10	Sulfate (Turbidimetric); Version #3 Date 10-19-2007	Definitive	Sulfate	D516-90, 02	Nepholometer	EcoTest Laboratories	N
L-11	Residue, Filterable (Gravimetric, dried at 180°C) aka Total Dissolved Solids; Version #3 Date 03/21/08	Definitive	Total Dissolved Solids	2540 C	Oven and Balance	EcoTest Laboratories	N
L-12	Alkalinity; Titration Method	Definitive	Alkalinity, Carbonate and Bicarbonate	2320 B	Titration (Colorimetric or pH Meter end point)	EcoTest Laboratories	N
L-13	The Determination of Chemical Oxygen Demand (COD) by Semi-Automated Colorimetry; Version #2 Date July 4, 2003	Definitive	Chemical Oxygen Demand	410.1	Spectrophotometer	EcoTest Laboratories	N
L-14	Nitrogen, Kjeldahl, Total (Colorimetric, Titrimeteric, Potentiometric); Version #2 Date July 12, 2003	Definitive	Total Kjeldahl Nitrogen (TKN)	4500 B	Digestion/Distilation with Colorimetric Titration	EcoTest Laboratories	N
L-15	Nitrogen, Ammonia (Titrimetric; Version #2 Date July 12, 2003	Definitive	Ammonia	4500-NH3-C	Distillation with Colorimetric Titration	EcoTest Laboratories	N

ICP – Inductively Coupled Plasma
ISE – Ion Selective Electrode
CVAAS – Cold Vapor Atomic Absorption Spectrometry
ECD – Electron Capture Detector

QAPP Worksheet #24
Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference[1]
GC/MS	Minimum 5 concentration levels 1 standard (mid)	Initial Daily 12 hour Continuing calibration	CCC< 30% RSD SPCC: Avg. RF>0.05 r^2 • 0.99 +/- 20% Diff CCC• 20%D, SPCC:RF• 0.05	Inspect system; correct problem; re-run calibration and affected samples	Analyst	L-1 L-2
ICP	Minimum 3 calibration standards and calibration blank1 ICV ICSA/ICSAB 1 standard	Daily Daily Daily Continuing	• .995 coefficient of variation r^2 • 0.99 +/- 10% Diff +/- 20% Diff, or • RL +/- 10% Diff	Inspect system; correct problem; re-run calibration and affected samples	Analyst	L-4
CVAAS	5 concentration levels 1 standard	Daily; or on continuing calibration failure Continuing; every 10 samples	• .995 coefficient of variation r^2 • 0.99 +/- 20% Diff	Inspect system; correct problem; re-run calibration and affected samples	Analyst	L-5

[1]Analytical SOP References table (Worksheet #23).

QAPP Worksheet #24 (continued)
Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference[1]
GC/ECD	5 concentration levels 1 standard (mid)	Initial Every 10 Samples	%D• 15%r² • 0.99 +/- 15% Diff	Inspect system; correct problem; re-run calibration and affected samples	Analyst	L-3
Technicon Autoanlyzer	6 concentration levels 1 standard (fullscale)	Daily - Full curve with each run. Initial, Every 16 Samples	• .995 coefficient of variation r² • 0.99 +/- 10% Diff	Inspect system; correct problem; re-run calibration and affected samples	Analyst	L-9
Spectrometer	6 concentration levels 1 standard (mid)	Quarterly Beginning and end of run	• .995 coefficient of variation +/- 10% Diff	Inspect system; correct problem; re-run calibration and affected samples	Analyst	L-7 L-13
Nephelometer	1 standard	Each use	• .995 coefficient of variation +/- 10% Diff	Inspect system; correct problem; re-run calibration and affected samples	Analyst	L-10
Ion Selective Electrode Instrument	5 concentration levels	Daily	• .995 coefficient of variation +/- 10% Diff	Inspect system; correct problem; re-run calibration and affected samples	Analyst	L-6
pH Meter	Calibrate with 4.0 and 7.0 buffers, check range with 10.0 buffer	Daily	Target value +/- 0.05 pH units	Inspect system; correct problem; re-run calibration and affected samples	Analyst	L-12
Analytical Balance	Annual full range calibration by outside service.	Daily check with class S weights; 50g, 1 g, 0.03g	50 g +/- 0.05g 1.0g +/- .005g 0.03 g +/- 0.0001g	Inspect system; correct problem; re-run calibration	Analyst	L-11

QAPP Worksheet #25
Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference[1]
GC/MS	Ion source cleaning and filament replacement Manual tuning Replace electron multiplier Clean out transfer line to GC	VOCs SVOCs	Check connections, bake out instrument, leak test	As needed; see SOPs	See SOPs L-1 and L-2	Inspect system; correct problem; re-run calibration and affected samples	Laboratory Personnel	L-1 L-2
ICP	Change capillary and pump tubing Replace liquid argon tank Replace and realign plasma torch Clean nebulizer and spray chamber	Metals	Check connections, replace worn equipment	As needed; see SOP	See SOP L-4	Inspect system; correct problem; re-run calibration and affected samples	Laboratory Personnel	L-4
CVAAS	Clean sample cell and tubing Check sparger condition Check level of mercury scrubber solution Replace lamps	Mercury	Check connections, replace worn equipment	As needed; see SOP	See SOP L-5	Inspect system; correct problem; re-run calibration and affected samples	Laboratory Personnel	L-5

[1]Analytical SOP References table (Worksheet #23).

QAPP Worksheet #25 (continued)
Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference[1]
GC/ECD	Clip column Change liner Clean injection port	OC Pesticides	Check connections, bake out instrument, leak test	As specified in SOP	See SOP L-3	Inspect system; correct problem; re-run calibration and affected samples	Analyst	L-3
Technicon Autoanalyzer	Change pump tubes	General Chemistry	Check connections Check flow in reagent lines	Daily inspection Pump tubes-monthly	See SOP L-9	Inspect system; correct problem; re-run calibration and affected samples.	Analyst	L-9
Oven	Thermometers Checked	General Chemistry	Compare to NIST Certified thermometer	Record Temperature twice daily, calibrate thermometer yearly	See SOP L-11	Inspect oven; correct problem; re-run calibration and affected samples. Use alternate oven until corrected.	Analyst	L-11
Balance	Professional Service Contract	General Chemistry	NA	1 times /year	See SOP L-11	Inspect balance; correct problem; re-run calibration. Use alternate balance until corrected.	Service Contractor	L-11
pH Meter	Change buffer fluid, Clean electrodes, Rinse electrodes	NA	Inspect probe for debris	Each use	See SOP L-12	Inspect meter; correct problem; re-run. Use alternate meter& probe until corrected.	Analyst	L-12

QAPP Worksheet #26
Sample Handling System

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT
Sample Collection (Personnel/Organization): STES Field Sampling Personnel
Sample Packaging (Personnel/Organization): STES Field Sampling Personnel
Coordination of Shipment (Personnel/Organization): STES Field Sampling Personnel
Type of Shipment/Carrier: STES Field Sampling Personnel
SAMPLE RECEIPT AND ANALYSIS
Sample Receipt (Personnel/Organization): Sample Receiving Personnel/EcoTest Laboratories
Sample Custody and Storage (Personnel/Organization): Sample Management Personnel/EcoTest Laboratories
Sample Preparation (Personnel/Organization): Sample Preparation Personnel/EcoTest Laboratories
Sample Determinative Analysis (Personnel/Organization): Analysts /EcoTest Laboratories
SAMPLE ARCHIVING
Field Sample Storage (No. of days from sample collection): 30 Days (from report submittal date)
Sample Extract/Digestate Storage (No. of days from extraction/digestion): 30 Days
Biological Sample Storage (No. of days from sample collection): NA
SAMPLE DISPOSAL
Personnel/Organization: Thomas Powell/EcoTest Laboratories
Number of Days from Analysis: as stated above

QAPP Worksheet #27
Sample Custody Requirements

Field Sample Custody Procedures
Groundwater, leachate, and stormwater samples will be collected in laboratory-supplied sample bottles.
Pre-cleaned sample containers will be obtained from the laboratory prior to field mobilization. The Field Sampling team will record receipt of the sample containers in the project logbook and verify that all required containers with appropriate preservative are present.
The following field custody procedure will be used for collection of samples:

- As few persons as possible should handle samples;
- Coolers or boxes containing cleaned bottles should be sealed during transport to the field;
- The sample collector is personally responsible for the care and custody of samples collected until they are transferred to another person or dispatched properly under COC protocols;
- The sample collector will record sample collection and identification information in the field logbook; and
- The Field Operations Leader will determine whether proper custody procedures were followed during field operations and decide if replacement samples are required.

Sample Labels
Sample labels or tags attached to or affixed around the sample container will be used to properly identify all samples collected in the field. Each sample container will be marked in ink with the following information:

§ Unique field identification number for each sample;
§ Date and time of sample collection;
§ Preservative;
§ Required analysis; and,
§ Sampler's initials.

Sample labels will be completed and affixed to the sample containers prior to collection or immediately following collection. Any mistakes in completion of sample labels will be changed with a single line cross-out with initials of the person making the change. Changes to the sample labels should be noted in the field logs.

QAPP Worksheet #27 (continued)
Sample Custody Requirements

Laboratory Sample Custody Procedures
The laboratory will be prepared to receive the samples and will be responsible for sample custody. The laboratory must follow internal written procedures for shipping containers, receiving, and internally managing samples. Internal laboratory custody protocols must implement a system that maintains security and integrity of the samples during log in, sample analysis, data storage and reporting, and sample disposal. These procedures must ensure adequate documentation of sample custody from receipt to disposal.

Laboratories must complete a cooler receipt form documenting the temperature and condition of the samples on receipt. The form must be included in the laboratory data package. The laboratory personnel are responsible for the care and custody of samples from the time of receipt until the sample is exhausted, or disposed. Samples will be archived and disposed for the timeframes described in Worksheet #26.

Sample Identification and Chain-of Custody Procedures
All samples will be properly labeled and identified, and the Groundwater Sampling Form or Water Sampling Log and Chain-of-Custody Form will be completely filled out. The following information is required on each sample label: sample identification, date collected, time collected, location, sampler initials, analysis to be performed, and preservative.

All sample containers will be checked for proper identification/labeling and compared to the Chain-of-Custody Form for accuracy prior to packaging any sample for shipment. The Chain-of-Custody Form will be placed in a sealed plastic bag and taped to the underside of the cooler lid.

QAPP Worksheet #28-1
QC Samples Table

Matrix	Aqueous
Analytical Group	TCL VOCs
Concentration Level	All
Sampling SOP	SMP-3
Analytical Method/ SOP Reference	L-1
Sampler's Name	NA
Field Sampling Organization	STES
Analytical Organization	EcoTest Laboratories
No. of Sample Locations	12

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Field Duplicate	1 per batch	RPD < 20%	Qualify data as needed	Lab personnel and/or STES personnel	Precision-Overall	RPD < 20%
Surrogates	3 per sample	%Recovery (%R) Lab generated limits	Qualify data as needed	Lab personnel	Accuracy/Bias	%Recovery (%R) Lab generated limits
Blanks (Field, Trip, Equip., Method)	Numerous	< Reporting Limit (RL)	Qualify data as needed	Lab personnel and/or STES personnel	Accuracy/Bias Contamination	< Reporting Limit (RL)
Laboratory Control Sample (LCS)/LCS Duplicate (LCSD)	1 per batch	%Recovery (%R) Lab generated limits	Qualify data as needed	Lab personnel	Precision-lab	%Recovery (%R) Lab generated limits
LCS/LCSD	1 per batch	RPD Lab generated limits	Qualify data as needed	Lab personnel	Accuracy/Bias	RPD Lab generated limits

QAPP Worksheet #28-1 (continued)
QC Samples Table

Matrix	Aqueous
Analytical Group	TCL VOCs
Concentration Level	All
Sampling SOP	SMP-3
Analytical Method/ SOP Reference	L-1
Sampler's Name	NA
Field Sampling Organization	STES
Analytical Organization	EcoTest Laboratories
No. of Sample Locations	12

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Instrument Performance Check: Bromofluorobenzene (BFB)	1/calibration	% Relative Abundance	Qualify data as needed	Lab personnel	Accuracy/Bias	% Relative Abundance
Internal Standard	At least three/sample	Area Response & Retention Times	Qualify data as needed	Lab personnel	Precision	Area Response & Retention Times
Matrix or Blank Spike (MS)	1/batch	%R Lab generated limits	Qualify data as needed	Lab personnel	Accuracy/Bias	%R Lab generated limits
Matrix or Blank Spike Duplicate (MSD)	1/batch	%R Lab generated limits	Qualify data as needed	Lab personnel	Accuracy/Bias	%R Lab generated limits
MS/MSD	1/batch	RPD Lab generated limits	Qualify data as needed	Lab personnel	Precision	RPD Lab generated limits

QAPP Worksheet #28-2
QC Samples Table

Matrix	Aqueous
Analytical Group	TCL SVOCs
Concentration Level	All
Sampling SOP	SMP-3
Analytical Method/ SOP Reference	L-2
Sampler's Name	NA
Field Sampling Organization	STES
Analytical Organization	EcoTest Laboratories
No. of Sample Locations	12

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Field Duplicate	1 per 20 field samples of similar matrix	RPD < 20%	Qualify data as needed	STES personnel	Precision-Overall	• 20% RPD
Surrogates	6 per sample	%Recovery (%R) Lab generated limits	Qualify data as needed	Lab personnel	Accuracy/Bias	%Recovery (%R) lab generated limits
Method Blanks	1 per analytical batch	< Reporting Limit (RL)	Qualify data as needed	Lab personnel	Accuracy/Bias Contamination	< Reporting Limit (RL)
Equipment Blanks	1 per 20 field samples	< Reporting Limit (RL)	Qualify data as needed	STES personnel	Accuracy/Bias Contamination	< Reporting Limit (RL)
Laboratory control sample	1 per analytical batch	%R Lab generated limits	Qualify data as needed	Lab personnel	Accuracy/Bias	%R lab generated limits
Internal Standard	At least three/sample	Area Response & Retention Times	Qualify data as needed	Lab personnel	Precision	Area Response & Retention Times

QAPP Worksheet #28-2 (continued)
QC Samples Table

Matrix	Aqueous
Analytical Group	TCL SVOCs
Concentration Level	All
Sampling SOP	SMP-3
Analytical Method/ SOP Reference	L-2
Sampler's Name	NA
Field Sampling Organization	STES
Analytical Organization	EcoTest Laboratories
No. of Sample Locations	12

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Instrument Performance Check: (DFTPP)	1/calibration	% Relative Abundance	Qualify data as needed	Lab personnel	Accuracy/Bias	% Relative Abundance
Matrix or Blank Spike (MS)	1/batch	%R Lab generated limits	Qualify data as needed	Lab and/or STES personnel	Accuracy/Bias	%R lab generated limits
Matrix or Blank Spike Duplicate (MSD)	1/batch	%R Lab generated limits	Qualify data as needed	Lab and/or STES personnel	Accuracy/Bias	%R lab generated limits
MS/MSD	1/batch	RPD Lab generated limits	Qualify data as needed	Lab and/or STES personnel	Precision	RPD lab generated limits
Laboratory Control* Sample Duplicate	1/batch	%R Lab generated limits	Qualify data as needed	Lab personnel	Accuracy/Bias	%R lab generated limits
LCS/LCSD*	1/batch	%R Lab generated limits	Qualify data as needed	Lab personnel	Precision	RPD lab generated limits

*LCS/LCSD used when MS/MSD not supplied by client.

QAPP Worksheet #28-3
QC Samples Table

Matrix	Aqueous
Analytical Group	TAL Metals
Concentration Level	All
Sampling SOP	SMP-3
Analytical Method/ SOP Reference	L-4, L-5
Sampler's Name	NA
Field Sampling Organization	STES
Analytical Organization	EcoTest Laboratories
No. of Sample Locations	12

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Field Duplicate	1/batch	RPD < 20%	Qualify data as needed	Lab personnel and/or STES personnel	Precision-Overall	RPD < 20%
Laboratory Duplicate	1/batch	RPD < 20%	Qualify data as needed	Lab personnel	Precision-lab	RPD < 20%
Blanks (Field, Trip, Equip., Method)	Numerous	< Reporting Limit (RL)	Qualify data as needed	Lab personnel and/or STES personnel	Accuracy/Bias Contamination	< Reporting Limit (RL)
Calibration verification blanks	Numerous	%R (90-110)	Qualify data as needed	Lab personnel	Accuracy/Bias Contamination	%R (90-110)
Interference check sample (A and AB)	4/run	Certain metals (%R) (80-120)	Qualify data as needed	Lab personnel	Precision-lab	Certain metals (%R) (80-120)

QAPP Worksheet #28-3 (continued)
QC Samples Table

Matrix	Aqueous
Analytical Group	TAL Metals
Concentration Level	All
Sampling SOP	SMP-3
Analytical Method/ SOP Reference	L-4, L-5
Sampler's Name	NA
Field Sampling Organization	STES
Analytical Organization	EcoTest Laboratories
No. of Sample Locations	12

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Matrix Spike	1/batch	%R (75-125)	Qualify data as needed	Lab personnel	Accuracy/Bias	%R (75-125)
Laboratory control sample (LCS)	1/batch	%R (80-120)	Qualify data as needed	Lab personnel	Accuracy/Bias	%R (80-120)
Post digestion spike	1/batch	%R (75-125)	Qualify data as needed	Lab personnel	Accuracy/Bias	%R (75-125)
Serial dilution	1/batch	%Difference (%D) < 10%	Qualify data as needed	Lab personnel	Precision	%Difference (%D) < 10%

QAPP Worksheet #28-4
QC Samples Table

Matrix	Aqueous
Analytical Group	TCL Organochlorine Pesticides
Concentration Level	All
Sampling SOP	SMP-3
Analytical Method/ SOP Reference	L-3
Sampler's Name	NA
Field Sampling Organization	STES
Analytical Organization	EcoTest Laboratories
No. of Sample Locations	12

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Field Duplicate	1 per 20 field samples of similar matrix	• 20% RPD	Qualify data as needed	STES personnel	Precision-Overall	• 20% RPD
Surrogates	2 per sample	%Recovery (%R) Lab generated limits	Qualify data as needed	Lab personnel	Accuracy/Bias	%Recovery (%R) lab generated limits
Method Blanks	1 per analytical batch	< Reporting Limit (RL)	Qualify data as needed	Lab personnel	Accuracy/Bias Contamination	< Reporting Limit (RL)
Equipment Blanks	1 per 20 field samples	< Reporting Limit (RL)	Qualify data as needed	STES personnel	Accuracy/Bias Contamination	< Reporting Limit (RL)
Laboratory control sample	1 per analytical batch	%R Lab generated limits	Qualify data as needed	Lab personnel	Accuracy/Bias	%R lab generated limits

QAPP Worksheet #28-4 (continued)
QC Samples Table

Matrix	Aqueous
Analytical Group	TCL Organochlorine Pesticides
Concentration Level	All
Sampling SOP	SMP-3
Analytical Method/ SOP Reference	L-3
Sampler's Name	NA
Field Sampling Organization	STES
Analytical Organization	EcoTest Laboratories
No. of Sample Locations	12

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Laboratory control sample (LCS)/LCS duplicate (LCSD)*	1/batch	%R Lab generated limits	Qualify data as needed	Lab personnel	Accuracy/Bias	%R Lab generated limits
LCS/LCSD*	1/batch	%R Lab generated limits	Qualify data as needed	Lab personnel	Precision	%R Lab generated limits
Matrix or Blank Spike (MS)/ MS duplicate (MSD)	1/batch	%R Lab generated limits	Qualify data as needed	Lab and/or STES personnel	Accuracy/Bias	%R Lab generated limits
MS/MSD	1/batch	RPD Lab generated limits	Qualify data as needed	Lab and/or STES personnel	Precision	RPD Lab generated limits

*LCS/LCSD used when MS/MSD not supplied by the client.

QAPP Worksheet #28-5
QC Samples Table

Matrix	Aqueous
Analytical Group	Cyanide
Concentration Level	All
Sampling SOP	SMP-3
Analytical Method/ SOP Reference	L-7
Sampler's Name	NA
Field Sampling Organization	STES
Analytical Organization	EcoTest Laboratories
No. of Sample Locations	12

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Field Duplicate	1 per 20 field samples of similar matrix	• 20% RPD	Qualify data as needed	STES personnel	Precision-Overall	• 20% RPD
Method Blanks	1 per analytical batch	• Reporting Limit (RL)	Qualify data as needed	Lab personnel	Accuracy/Bias Contamination	• 1/2 Reporting Limit (RL)
Equipment Blanks	1 per 20 field samples	< Reporting Limit (RL)	Qualify data as needed	STES personnel	Accuracy/Bias Contamination	< Reporting Limit (RL)
Laboratory control sample (LCS)/LCS duplicate (LCSD)	1 per analytical batch	%R Lab generated limits	Qualify data as needed	Lab personnel	Accuracy/Bias	%R Lab generated limits
Matrix or Blank Spike (MS)/ MS duplicate (MSD)	1/batch	%R Lab generated limits	Qualify data as needed	Lab and/or STES personnel	Accuracy/Bias	%R Lab generated limits
MS/MSD	1/batch	RPD Lab generated limits	Qualify data as needed	Lab and/or STES personnel	Precision	RPD Lab generated limits

QAPP Worksheet #28-6
QC Samples Table

Matrix	Aqueous
Analytical Group	TDS
Concentration Level	All
Sampling SOP	SMP-3
Analytical Method/ SOP Reference	L-11
Sampler's Name	NA
Field Sampling Organization	STES
Analytical Organization	EcoTest Laboratories
No. of Sample Locations	12

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Field Duplicate	1 per 20 field samples of similar matrix	• 20% RPD	Qualify data as needed	STES personnel	Precision-Overall	• 20% RPD
Laboratory Duplicate	1 per analytical batch	RPD Lab generated limits	Qualify data as needed	Lab personnel	Precision-lab	RPD Lab generated limits
Method Blanks	1 per analytical batch	• Reporting Limit (RL)	Qualify data as needed	Lab personnel	Accuracy/Bias Contamination	• Reporting Limit (RL)
Equipment Blanks	1 per 20 field samples	< Reporting Limit (RL)	Qualify data as needed	STES personnel	Accuracy/Bias Contamination	< Reporting Limit (RL)
Laboratory control sample (LCS)/LCS duplicate (LCSD)	1 per analytical batch	%R Lab generated limits	Qualify data as needed	Lab personnel	Accuracy/Bias	%R Lab generated limits
Matrix or Blank Spike (MS)/ MS duplicate (MSD)	1/batch	%R Lab generated limits	Qualify data as needed	Lab and/or STES personnel	Accuracy/Bias	%R Lab generated limits
MS/MSD	1/batch	RPD Lab generated limits	Qualify data as needed	Lab and/or STES personnel	Precision	RPD Lab generated limits

QAPP Worksheet #28-7
QC Samples Table

Matrix	Aqueous
Analytical Group	COD
Concentration Level	All
Sampling SOP	SMP-3
Analytical Method/ SOP Reference	L-13
Sampler's Name	NA
Field Sampling Organization	STES
Analytical Organization	EcoTest Laboratories
No. of Sample Locations	12

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Field Duplicate	1 per 20 field samples of similar matrix	• 20% RPD	Qualify data as needed	STES personnel	Precision-Overall	• 20% RPD
Method Blanks	1 per analytical batch	• Reporting Limit (RL)	Qualify data as needed	Lab personnel	Accuracy/Bias Contamination	• 1/2 Reporting Limit (RL)
Equipment Blanks	1 per 20 field samples	< Reporting Limit (RL)	Qualify data as needed	STES personnel	Accuracy/Bias Contamination	< Reporting Limit (RL)
Initial Calibration:	As Needed	R• 0.995	Qualify data as needed	Lab personnel	Accuracy/Bias	R• 0.995
Laboratory control sample (LCS)/LCS duplicate (LCSD)	1/batch	%R Lab generated limits	Qualify data as needed	Lab and/or STES personnel	Accuracy/Bias	%R Lab generated limits
Matrix or Blank Spike (MS)/ MS duplicate (MSD)	1/batch	%R Lab generated limits	Qualify data as needed	Lab and/or STES personnel	Accuracy/Bias	%R Lab generated limits
LCS/LCSD and MS/MSD	1/batch	RPD Lab generated limits	Qualify data as needed	Lab and/or STES personnel	Precision	RPD Lab generated limits

QAPP Worksheet #28-8
QC Samples Table

Matrix	Aqueous
Analytical Group	Alkalinity
Concentration Level	All
Sampling SOP	SMP-3
Analytical Method/ SOP Reference	L-12
Sampler's Name	NA
Field Sampling Organization	STES
Analytical Organization	EcoTest Laboratories
No. of Sample Locations	12

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Field Duplicate	1 per 20 field samples of similar matrix	• 20% RPD	Qualify data as needed	STES personnel	Precision-Overall	• 20% RPD
Method Blanks	1 per analytical batch	• Reporting Limit (RL)	Qualify data as needed	Lab personnel	Accuracy/Bias Contamination	• 1/2 Reporting Limit (RL)
Equipment Blanks	1 per 20 field samples	< Reporting Limit (RL)	Qualify data as needed	STES personnel	Accuracy/Bias Contamination	< Reporting Limit (RL)
Laboratory control sample (LCS)/LCS duplicate (LCSD)	1 per analytical batch	%R Lab generated limits	Qualify data as needed	Lab personnel	Accuracy/Bias	%R Lab generated limits
LCS/LCSD	1 per analytical batch	%R Lab generated limits	Qualify data as needed	Lab personnel	Accuracy/Bias	%R Lab generated limits

QAPP Worksheet #28-9
QC Samples Table

Matrix	Aqueous
Analytical Group	Ammonia
Concentration Level	All
Sampling SOP	SMP-3
Analytical Method/ SOP Reference	L-6
Sampler's Name	NA
Field Sampling Organization	STES
Analytical Organization	EcoTest Laboratories
No. of Sample Locations	12

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Field Duplicate	1 per 20 field samples of similar matrix	• 20% RPD	Qualify data as needed	STES personnel	Precision-Overall	• 20% RPD
Method Blanks	1 per analytical batch	• Reporting Limit (RL)	Qualify data as needed	Lab personnel	Accuracy/Bias Contamination	• 1/2 Reporting Limit (RL)
Equipment Blanks	1 per 20 field samples	< Reporting Limit (RL)	Qualify data as needed	STES personnel	Accuracy/Bias Contamination	< Reporting Limit (RL)
Laboratory control sample	1 per analytical batch	%R Lab generated limits	Qualify data as needed	Lab personnel	Accuracy/Bias	%R 90-110

QAPP Worksheet #28-9 (continued)
QC Samples Table

Matrix	Aqueous
Analytical Group	Ammonia
Concentration Level	All
Sampling SOP	SMP-3
Analytical Method/ SOP Reference	L-6 or L-15
Sampler's Name	NA
Field Sampling Organization	STES
Analytical Organization	EcoTest Laboratories
No. of Sample Locations	12

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Matrix or Blank Spike (MS)	1/batch	%R Lab generated limits	Qualify data as needed	Lab and/or STES personnel	Accuracy/Bias	%R 90-110
Matrix or Blank Spike Duplicate (MSD)	1/batch	%R Lab generated limits	Qualify data as needed	Lab and/or STES personnel	Accuracy/Bias	%R 90-110
MS/MSD	1/batch	RPD Lab generated limits	Qualify data as needed	Lab and/or STES personnel	Precision	RPD <20%

QAPP Worksheet #28-10
QC Samples Table

Matrix	Aqueous
Analytical Group	Chloride
Concentration Level	All
Sampling SOP	SMP-3
Analytical Method/ SOP Reference	L-8
Sampler's Name	NA
Field Sampling Organization	STES
Analytical Organization	EcoTest Laboratories
No. of Sample Locations	12

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Field Duplicate	1 per 20 field samples of similar matrix	• 20% RPD	Qualify data as needed	STES personnel	Precision-Overall	• 20% RPD
Method Blanks	1 per analytical batch	• Reporting Limit (RL)	Qualify data as needed	Lab personnel	Accuracy/Bias Contamination	• Reporting Limit (RL)
Equipment Blanks	1 per 20 field samples	< Reporting Limit (RL)	Qualify data as needed	STES personnel	Accuracy/Bias Contamination	< Reporting Limit (RL)
Laboratory control sample (LCS)/LCS duplicate (LCSD)	1/batch	%R Lab generated limits	Qualify data as needed	Lab and/or STES personnel	Accuracy/Bias	%R Lab generated limits
Matrix or Blank Spike (MS)/ MS duplicate (MSD)	1/batch	%R Lab generated limits	Qualify data as needed	Lab and/or STES personnel	Accuracy/Bias	%R Lab generated limits
LCS/LCSD and MS/MSD	1/batch	RPD Lab generated limits	Qualify data as needed	Lab and/or STES personnel	Precision	RPD Lab generated limits

QAPP Worksheet #28-11
QC Samples Table

Matrix	Aqueous
Analytical Group	Sulfate
Concentration Level	All
Sampling SOP	SMP-3
Analytical Method/ SOP Reference	L-10
Sampler's Name	NA
Field Sampling Organization	STES
Analytical Organization	EcoTest Laboratories
No. of Sample Locations	12

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Field Duplicate	1 per 20 field samples of similar matrix	• 20% RPD	Qualify data as needed	STES personnel	Precision-Overall	• 20% RPD
Method Blanks	1 per analytical batch	• Reporting Limit (RL)	Qualify data as needed	Lab personnel	Accuracy/Bias Contamination	• 1/2 Reporting Limit (RL)
Equipment Blanks	1 per 20 field samples	< Reporting Limit (RL)	Qualify data as needed	STES personnel	Accuracy/Bias Contamination	< Reporting Limit (RL)
Laboratory control sample (LCS)/LCS duplicate (LCSD)	1/batch	%R Lab generated limits	Qualify data as needed	Lab and/or STES personnel	Accuracy/Bias	%R Lab generated limits
Matrix or Blank Spike (MS)/ MS duplicate (MSD)	1/batch	%R Lab generated limits	Qualify data as needed	Lab and/or STES personnel	Accuracy/Bias	%R Lab generated limits
LCS/LCSD and MS/MSD	1/batch	RPD Lab generated limits	Qualify data as needed	Lab and/or STES personnel	Precision	RPD Lab generated limits

QAPP Worksheet #28-12
QC Samples Table

Matrix	Aqueous
Analytical Group	Nitrate
Concentration Level	All
Sampling SOP	SMP-3
Analytical Method/ SOP Reference	L-9
Sampler's Name	NA
Field Sampling Organization	STES
Analytical Organization	EcoTest Laboratories
No. of Sample Locations	12

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Field Duplicate	1 per 20 field samples of similar matrix	• 20% RPD	Qualify data as needed	STES personnel	Precision-Overall	• 20% RPD
Method Blanks	1 per analytical batch	• Reporting Limit (RL)	Qualify data as needed	Lab personnel	Accuracy/Bias Contamination	• 1/2 Reporting Limit (RL)
Equipment Blanks	1 per 20 field samples	< Reporting Limit (RL)	Qualify data as needed	STES personnel	Accuracy/Bias Contamination	< Reporting Limit (RL)
Laboratory control sample (LCS)/LCS duplicate (LCSD)	1/batch	%R Lab generated limits	Qualify data as needed	Lab and/or STES personnel	Accuracy/Bias	%R Lab generated limits
Matrix or Blank Spike (MS)/ MS duplicate (MSD)	1/batch	%R Lab generated limits	Qualify data as needed	Lab and/or STES personnel	Accuracy/Bias	%R Lab generated limits
LCS/LCSD and MS/MSD	1/batch	RPD Lab generated limits	Qualify data as needed	Lab and/or STES personnel	Precision	RPD Lab generated limits

QAPP Worksheet #28-13
QC Samples Table

Matrix	Aqueous
Analytical Group	Total Kjeldahl Nitrogen
Concentration Level	All
Sampling SOP	SMP-3
Analytical Method/ SOP Reference	L-14
Sampler's Name	NA
Field Sampling Organization	STES
Analytical Organization	EcoTest Laboratories
No. of Sample Locations	12

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Field Duplicate	1 per 20 field samples of similar matrix	• 20% RPD	Qualify data as needed	STES personnel	Precision-Overall	• 20% RPD
Method Blanks	1 per analytical batch	• Reporting Limit (RL)	Qualify data as needed	Lab personnel	Accuracy/Bias Contamination	• 1/2 Reporting Limit (RL)
Equipment Blanks	1 per 20 field samples	< Reporting Limit (RL)	Qualify data as needed	STES personnel	Accuracy/Bias Contamination	< Reporting Limit (RL)
Laboratory control sample (LCS)/LCS duplicate (LCSD)	1/batch	%R Lab generated limits	Qualify data as needed	Lab and/or STES personnel	Accuracy/Bias	%R Lab generated limits
Matrix or Blank Spike (MS)/ MS duplicate (MSD)	1/batch	%R Lab generated limits	Qualify data as needed	Lab and/or STES personnel	Accuracy/Bias	%R Lab generated limits
LCS/LCSD and MS/MSD	1/batch	RPD Lab generated limits	Qualify data as needed	Lab and/or STES personnel	Precision	RPD Lab generated limits

QAPP Worksheet #29
Project Documents and Records Table

Sample Collection Documents and Records	On-site Analysis Documents and Records	Off-site Analysis Documents and Records	Data Assessment Documents and Records	Other
-Field Notes -Sampling Logs -Chain-of-Custody Records -Custody Seals	-Equipment Calibration Logs -Field Data Records -Field Instrument Maintenance Logs	-Sample Receipt, Custody, and Tracking Records -Standard Traceability Logs -Equipment Calibration Logs -Sample Prep Logs -Run Logs -Equipment Maintenance, Testing, and Inspection Logs -Corrective Action Forms -Reported Field Sample Results -Reported Results for Standards, QC Checks, and QC Samples -Instrument Printouts (raw data) for Field Samples, Standards, QC Checks, and QC Samples -Sample Disposal Records -Extraction/Clean-up Records -Raw Data (stored on disk or CD-R) -Analytical Reports	-Data Validation Checklists	-SMP -QAPP

QAPP Worksheet #30
Analytical Services Table

Matrix	Analytical Group	Concentration Level	Analytical SOP	Data Package Turnaround Time	Laboratory/Organization (Name and Address, Contact Person and Telephone Number)	Backup Laboratory/Organization (Name and Address, Contact Person and Telephone Number)
Aqueous	All	All	L-1 L-2 L-3 L-4 L-5 L-6 L-7 L-8 L-9 L-10 L-11 L-12 L-13 L-14 L-15	14 Days	EcoTest Laboratories, N. Babylon, NY Thomas Powell, (631) 422-5777	NA

QAPP Worksheet #31
Planned Project Assessments Table

Assessment Type	Frequency	Internal or External	Organization Performing Assessment	Person(s) Responsible for Performing Assessment (Title and Organizational Affiliation)	Person(s) Responsible for Responding to Assessment Findings (Title and Organizational Affiliation)	Person(s) Responsible for Identifying and Implementing Corrective Actions (CA) (Title and Organizational Affiliation)	Person(s) Responsible for Monitoring Effectiveness of CA (Title and Organizational Affiliation)
Field Audit	1 per year	Internal	STES or ARCADIS	Designated by the ARCADIS QA Manager or STES	STES	ARCADIS/STES	ARCADIS/STES
Laboratory Audit	Per Laboratory Quality Assurance Program	Internal	EcoTest Laboratories	Thomas Powell, QA Manager, EcoTest Laboratories	EcoTest Laboratories, Supervisors and Staff	EcoTest Laboratories Management, Supervisors and Staff	Thomas Powell, QA Manager, EcoTest Laboratories
Field Inspections	Intermittent	Internal	STES	STES Field Site Manager	STES Field Teams	STES Field Teams	STES Field Site Manager

QAPP Worksheet #32
Assessment Findings and Corrective Action Responses

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (name, title, organization)	Timeframe of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (name, title, organization)	Timeframe for Response
Field Sampling Technical Systems Audit	Memorandum	NYCDEP STES	14 calendar days after audit	Memorandum	NYCDEP ARCADIS STES	5 working days after notification
Field Inspection	Memorandum	STES Field Manager	14 calendar days after audit	Memorandum	STES Field Sampling Teams and Management	5 working days after notification
Laboratory Technical Audit (internal)	Memorandum	Thomas Powell, QA Manager, EcoTest Laboratories	14 calendar days after audit	Memorandum	EcoTest Laboratories Management, Supervisors and Staff	5 working days after notification

QAPP Worksheet #33
QA Management Reports Table

Type of Report	Frequency (daily, weekly, monthly, quarterly, annually, etc.)	Projected Delivery Date(s)	Person(s) Responsible for Report Preparation (Title and Organizational Affiliation)	Report Recipient(s) (Title and Organizational Affiliation)
Data Usability Summary Report (DUSR)	1 per Sample Delivery Group	Semi-annual	To Be Determined	STES/ARCADIS
Site Management Report	1 after data review, analysis, and evaluation completed	Annual	To Be Determined	NYSDEC Region 2; NYCDEP

QAPP Worksheet #34
Verification (Step I) Process Table

Verification Input	Description	Internal/ External	Responsible for Verification (Name, Organization)
Chain-of-custody and shipping forms	Chain-of-custody forms and shipping documentation will be reviewed by laboratory upon receipt of samples for verification against the sample coolers they represent. Chain-of-custody form will be initialed by all parties that had custody of samples.	External	Gillen Mellograno/EcoTest Laboratories
Field Notes and Sampling Logs	All field notes and sampling logs will be reviewed internally and placed in the project file.	Internal	STES
Laboratory Data	All laboratory data packages will be verified internally by the laboratory performing the work for completeness and technical accuracy prior to submittal.	Internal	Thomas Powell/EcoTest Laboratories
Laboratory Data	All received data packages will be verified externally during data validation.	External	To Be Determined

QAPP Worksheet #35
Validation (Steps IIa and IIb) Process Table

Step IIa/IIb	Validation Input	Description	Responsible for Validation (Name, Organization)
Step IIa	Sampling Methods and Procedures	Establish that required sampling methods were used and that any deviations were noted. Ensure that the sampling procedures and field measurements met performance criteria and that any deviations were documented.	STES
Step IIa	Analytical Method and Procedures	Establish that required analytical methods were used and that any deviations were noted. Ensure that QC samples met performance criteria and that any deviations were documented.	Thomas Powell, EcoTest Laboratories Data Validator, To Be Determined
Step IIb	Documentation of QAPP QC Sample Results	Establish that all QAPP required QC samples were run and met required limits.	Data Validator, To Be Determined
Step IIb	Project Quantitation Limits	Determine that the project quantitation limits were achieved as outlined in the QAPP.	Data Validator, To Be Determined
Step IIb	Performance Criteria	Evaluate QC data against project-specific performance criteria in the QAPP, analytical methods, validation guidance, and professional judgment.	Data Validator, To Be Determined
Step IIb	DUSR	Summarize outcome of comparison of data to MPC in the QAPP. Include qualified data and explanation of all qualifiers.	Data Validator, To Be Determined

QAPP Worksheet #36
Validation (Steps IIa and IIb) Summary Table

Step IIa/IIb	Matrix	Analytical Group	Concentration Level	Validation Criteria	Data Validator (title and organizational affiliation)
IIa and IIb	Groundwater	VOCs, SVOCs, OC Pesticides, Metals, General Chemistry Parameters	All	USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, October 1999; USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, October 2002; Method Criteria, QAPP criteria; and professional judgment	Data Validator, To Be Determined
IIa and IIb	Leachate	VOCs, SVOCs, OC Pesticides, Metals, General Chemistry Parameters	All	USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, October 1999; USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, October 2002; Method Criteria, QAPP criteria; and professional judgment	Data Validator, To Be Determined
IIa and IIb	Stormwater	VOCs, SVOCs, OC Pesticides, Metals, General Chemistry Parameters	All	USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, October 1999; USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, October 2002; Method Criteria, QAPP criteria; and professional judgment	Data Validator, To Be Determined

QAPP Worksheet #37
Usability Assessment

The Data Usability Assessment will be performed and documented in the Data Usability Summary Report (DUSR). The Data Usability Assessment process involves data verification and data validation. Data verification is the process by which laboratory results are checked to ensure that the proper quality control steps were performed and the key items have met QC objectives (both analytical and contractual). The key items checked during the data verification include: data package deliverable completeness; a review of chain-of-custody records; a review of the case narrative; presentation of all analytical results; QC sample data summaries; and, that all applicable raw data are included. All required data deliverables must be present in the data package in order to proceed to the next step of data validation.

Data validation is a detailed process by which laboratory results are checked to ensure that all QC procedures have been followed and that they meet the minimum requirements specified in the analytical methodology and the contract. Data validation includes, but is not limited to, a review of holding times, blank contaminants, calibration results, surrogate results (where applicable), duplicate results (laboratory and field), matrix spike results, internal standards (where applicable), laboratory control sample results, and a confirmation of transcription from raw data to reporting/summary pages. The procedures to be used for data validation of all data are based on USEPA National Functional Guidelines (Organics, October 1999 and Inorganics, October 2002), analytical methods performed, laboratory control limits, the Project QAPP, and professional judgment.

The data quality indicators (DQIs) used to evaluate conformance with the project DQOs are presented below.

Representativeness

Representativeness is the degree to which sampling data accurately and precisely represent site conditions, and is dependent on sampling and analytical variability and the variability of environmental media at the site. Actions have been designed to assess the presence of chemical constituents at the time of sampling. The QAPP presents the rationale for sample quantities and location. This QAPP presents field sampling and laboratory analytical methodologies. Use of the prescribed field and laboratory analytical methods with associated holding times and preservation requirements is intended to provide representative data.

Comparability

Comparability is the degree of confidence with which one data set can be compared to another. Comparability between phases of the actions (if additional phases are required) will be maintained through consistent use of the sampling and analytical methodologies set forth in this QAPP, established QA/QC procedures and use of appropriately trained personnel.

Precision: To determine precision of the method, a routine program of duplicate analyses shall be performed. The results of the duplicate analyses are used to calculate the Relative Percent Difference (RPD), which is the governing QC parameter for precision.

$$RPD\ \% = 100\ x\ \frac{(D_1 - D_2)}{(D_1 + D_2)/2}$$

where:
D_1 = the larger of the two observed values
D_2 = the smaller of the two observed values
Additional determiners of precision may be specified by methods

QAPP Worksheet #37 (continued)
Usability Assessment

Accuracy: Accuracy shall be estimated based on results of LCS analyses and/or matrix spike recoveries and/or the use of other performance evaluation samples or standards as specified by the methods. Accuracy is expressed in terms of percent recovery as expressed in the following formulas:

A. For LCS:

$$Percent\ \ Recovery = 100\ x\ \frac{measured\ \ value}{true\ \ value}$$

B. For matrix spikes:

$$Percent\ \ Recovery = 100\ x\ \frac{C_i - C_0}{C_t}$$

where:

C_o = value of unspiked aliquot
C_i = value of spiked aliquot
C_t = value of spike added

Completeness: Overall Completeness shall be reported as the percentage of all measurements (excluding QC samples) made with results judged to be valid following data validation. The following formula will be used to estimate completeness:

$$Percent\ Completeness = 100\ x \frac{V}{T}$$

where:
V = number of required measurements judged valid
T = total number of required measurements (except QC samples).
Completeness shall be evaluated relative to the length of the project and the specified holding time. If the completeness is less than 90 percent, explanatory documentation shall be provided that (1) states why this completeness percentage is acceptable for the project and (2) evaluates the impact of this completeness percentage on the project.

QAPP Worksheet #37 (continued)
Usability Assessment

Sensitivity

Sensitivity is a quantitative measurement to determine if the analytical laboratory's procedures/methodologies and their associated MDLs can satisfy the project requirements as they relate to the project action limits. MDLs are updated annually by the laboratory. The current MDLs for the analytical laboratories are presented in Worksheet #15.

Data Validation and Usability

All data generated will be verified/validated using the most recent versions of the analytical method performance criteria, USEPA National Functional Guidelines (USEPA 1999; 2002) and USEPA Region II SOPs, laboratory control limits, the project QAPP, and professional judgment. These procedures and criteria may be modified, as necessary, to address project-specific and method-specific criteria, control limits and procedures. Data validation will consist of data screening, checking, reviewing, editing and interpretation to document analytical data quality and to determine whether the quality is sufficient to meet the DQOs.

The data validator will verify that reduction of laboratory measurements and laboratory reporting of analytical parameters is in accordance with the procedures specified for each analytical method and/or as specified in this QAPP. Any deviations from the analytical method or any special reporting requirements apart from those specified in this QAPP will be detailed on COC forms.

QAPP Worksheet #37 (continued)
Usability Assessment

Upon receipt of laboratory data, the following procedures will be executed by the data validator:

- Evaluate completeness of data package.
- Verify that field COC forms were completed and that samples were handled properly.
- Verify that holding times were met for each parameter. Holding time exceedances, should they occur, will be documented. Data for all samples exceeding holding time requirements will be flagged as either estimated or rejected. The decision as to which qualifier is more appropriate will be made on a case-by-case basis.
- Verify that parameters were analyzed according to the methods specified.
- Review QA/QC data (i.e., confirm that duplicates, blanks and spikes were analyzed on the required number of samples, as specified in the method and verify that duplicate and MS recoveries are acceptable).
- Investigate anomalies identified during review. When anomalies are identified, they will be discussed with the Project Manager and/or Laboratory Manager, as appropriate.
- If data appear suspect, investigate the specific data of concern. Calculations will be traced back to raw data. If calculations do not agree, the cause will be determined and corrected.

Deficiencies discovered as a result of the data review, as well as the corrective actions implemented in response will be summarized, as applicable, to each method in the DUSR.

It should be noted that qualified results do not necessarily invalidate data. The goal to produce the best possible data does not necessarily mean that data must be produced without QC qualifiers. Qualified data can provide useful information.

QAPP Worksheet #37 (continued)
Usability Assessment

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results will be qualified with the following codes

- U The analyte/compound was analyzed for, but not detected. The associated value is the compound quantitation limit.
- UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
- J The compound was positively identified; however, the associated numerical value is an estimated concentration only.
- JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
- R The sample results are rejected.

The "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort.

It should be noted that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data, but any value potentially contains error.

Validation Reports

The DUSRs will identify all deficiencies and the potential impact on the results. The Validation and Database Project personnel will amend qualifiers generated during the validation process to the database. The DUSR and the database will be the primary location of all applicable data qualifiers. Qualifiers will not be applied to the hard copy analytical reports.

Field Data Review

The quality objective for the field measurement activities is to obtain accurate measurements of sample characteristics, including pH, conductivity, temperature, turbidity, dissolved oxygen and/or redox potential, using appropriate equipment. Data are recorded in field logbooks or on field sampling sheets and calibration logs. Calibration logs will be reviewed with other field documentation to identify any potential impacts to data quality and usability. Field logbooks are reviewed as part of the QC inspections.

ATTACHMENT 1

EcoTest Laboratories Quality Assurance Manual

ECO TEST LABORATORIES, INC.

ENVIRONMENTAL TESTING

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ELAP Laboratory ID# 10320

LABORATORY QUALITY MANUAL

TECHNICAL DIRECTOR: THOMAS R. TREUTLEIN

QUALITY ASSURANCE OFFICER: THOMAS U. POWELL

APPROVED: _____ DATE: 12/21/07
TECHNICAL DIRECTOR

APPROVED: _____ DATE: 12/21/07
QUALITY ASSURANCE OFFICER

NOTE: This manual is based on New York State Department of Health, Environmental Laboratory Approval Program (NYSDOH ELAP) template.

CONTROLLED COPIES STAMPLED "ORIGINAL " IN BLUE INK.

REVISION RECORD: Rev. No. 6, 12-19-07, by Tom Powell

Page/Section	Changes
All pages-footer	• Controlled copies are now stampled "original" in blue ink instead of being printed in on blue letterhead.
Sec 2. Quality policy	• Minor changes in wording for clarification
Sec 4 Job Descriptions	• Minor changes in formatting text – bullets added • Add to Sample Manager's duties: measures & records sample temperatures • Add to Sample Manager's duties: Contact clients when there are questions regarding samples **or when sample preservation, storage and shipping conditions, containers or other factors may have compromised the samples.**
Sec 24 References	• Update reference – ELAP Manaul 05/23/07 version.

- ANNUAL REVIEW (PERFORMED IF DOCUMENT HAS NOT BEEN REVISED IN THE PAST 12 MONTHS)

Signature	Title	Date
Signature	Title	Date
Signature (Responsible Person in Revision Record)	Title	Date

- TRAINING AND DISTRIBUTION OF QUALITY MANUAL RECORD - See Appendix E

- RECORD OF INITIALS OF ALL STAFF –
  This documentation is on file with Quality Assurance (QA) Officer and will be distributed as needed to each department separately from laboratory quality document.

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APPENDICES:

Appendix A - Code of Ethics/Data Integrity
Appendix B - Organization Chart
Appendix C - Sample Holding Times, Containers and Preservatives
Appendix D - Certificates of Approval, New York State DOH ELAP
Appendix E – Quality Manual Training & Distribution Record
Appendix F – List of Equipment

1. QUALITY POLICY

EcoTest Laboratories, Inc. is an independent, environmental testing laboratory which was founded in 1977. The company was founded by and is owned and co-directed by Thomas Powell and Thomas Treutlein.

Our main goal at EcoTest Laboratories is to produce the most accurate and precise analytical results possible, as quickly as possible. The data must be technically defensible for clients who must comply with Federal and state and local regulations such as SPDES, NPDES, RCRA, and SDWA.

Our efforts are concentrated on analytical chemistry and microbiology with a minimum of interpretive and consulting work. Because of the importance of our work to our clients in health, legal, economic, and other matters, we have instituted a comprehensive Quality Assurance/Quality Control (QA/QC) program. The standard operating procedures described herein were designed by our staff to incorporate all those aspects needed for a good QA/QC program and in conformance with the NELAC standard adopted by the New York State Environmental Laboratory Approval Program (NYSELAP). This includes the following:

- Adequately staffed and equipped laboratory facility,
- Successful participation in the proficiency testing program operated by the New York State DOH Environmental Laboratory Approval Program or another accredited provider,
- Successful implementation of a NELAC compliant quality system,
- Annual internal audits with management review,
- Successful biennial assessments by the New York State Environmental Laboratory Approval Program, or Primary Accrediting Authority,

- Timely reporting of laboratory test results to the regulating authorities/clients,

- Laboratory test results that are supported by fully documented quality control data and laboratory testing procedures.

The quality policy is communicated to employees during the training of new hires. It is understood, implemented, and maintained by employees at all levels. This is documented by management through the employee evaluation process, the training procedure, the internal audit process, and the document control process. The technical director ensures that the lab's policies and objectives for quality of testing services are documented in the Quality Manual. The technical director assures that the Quality Manual is communicated to, understood, and implemented by all personnel concerned. Documentation includes signed statements in each analyst's training file.

2. ACCREDITED TEST METHODS -

SEE APPENDIX C:
"CERTIFICATES OF APPROVAL - New York STATE DEPT. OF HEALTH, ENVIRONMENTAL LABORATORY APPROVAL PROGRAM."

METHOD REFERENCES

"Environmental Laboratory Approval Program Certification Manual", 2005 ed., NYSDOH ELAP.

"Standard Methods for the Examination of Water and Wastewater", 14th - 20th editions, APHA.

"Methods of Chemical Analysis of Water and Wastes", EPA 600/4-79-020, March 1979 and March 1983 rev.

"Methods for Benzidine, Chlorinated Organic Compounds, Pentachlorophenol and Pesticides in Water and Wastewater", EPA, Sept. 1978.

"Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", 3rd Edition, 1986, and Final Update III.

"NIOSH Manual of Analytical Methods", U.S. National Institute for Occupational Safety and Health, 2nd, 3rd and 4th editions (1994).

"Methods for the Determination of Organic Compounds in Drinking Water", EPA 600/4-88-039, 12/88 - rev. 7/91.

"Methods for the Determination of Organic Compounds in Drinking Water - Supplement 1", EPA 600-4-90-020, 7/90.

"Methods for the Determination of Organic Compounds in Drinking Water - Supplement 2", EPA 600-R-92-129, 8/92.

"Analytical Handbook, Laboratory of Organic Analytical Chemistry", Wadsworth Center for Laboratories and Research, NYS Dept. of Health, Including frequent updates.

".Compendium of Methods. for the Determination of. Toxic Organic Compounds. in Ambient Air. Second Edition" , USEPA/625/R-96/010b, Jan 1999

"Compendium of Methods for Determination of Toxic Organic Compounds in Air", First Ed., USEPA, 1990.

"Analytical Services Protocol", 2000 & 2005 Editions, Lawrence Bailey ed., New York State Dept. of Environmental Conservation.

3. QUALITY SYSTEM

The quality system defined in the quality manual applies to all personnel who perform activities affecting quality. All employees are responsible for the quality system. The individual documents define specific employee responsibilities.

Through a formal documented system of planned activities, the quality system meets the requirements of ISO guide 17025, NELAC Chapter 5, July 2003 and the New York State Department of Health, Environmental Laboratory Approval Program (NYSDOH ELAP). The quality manual is maintained current and up-to-date by the Quality Assurance (QA) Officer to reflect changes to the system. The laboratory defines its policy for each applicable standard element in the quality manual. For each element, as appropriate, the laboratory has documented procedures that further describe how the specific policy objectives and goals are met. The quality manual references these documented procedures. Where applicable, work instructions are referenced in the documented procedures and the quality manual.

Quality procedures and instructions are implemented as written. The procedures explain how the laboratory implements the standard requirements in accordance with its quality policy. They are revised, as necessary. to reflect the actual objectives, flow of tasks and staff responsibilities.

Work instructions are maintained in the laboratory methods manual. They specify the equipment and fixtures required, the resources and skills, what tests and verifications will be performed to measure process and product quality, the records and written documentation used by personnel and standards of acceptability. Work instructions are approved by the affected managerial staff and are maintained in the document control system.

3.1 DOCUMENT STRUCTURE

Level 1	Quality Manual
Level 2	Quality Procedures
Level 3	Work Instructions and Test Procedures
Level 4	Quality Records

4 JOB DESCRIPTIONS OF STAFF

A. Technical Director-

- Has overall responsibility for the technical operation of the lab. The technical director is also responsible for arranging and overseeing all support services including instrument service contracts, subcontracting sample analyses, and physical maintenance of the laboratory. The technical director also interacts with regulatory officials from outside the lab such as those performing audits and inspections of the lab.

- Is responsible for providing supervision to all laboratory personnel to ensure adherence to lab documented procedures. When the director is not present in the lab, an employee who is familiar with the calibration and test procedures, the objective of the calibration or test, and the assessment of results, will be appointed by the director to supervise.

- Shall certify that personnel with appropriate educational and/or technical background perform all tests for which the lab is accredited.

- Shall ensure that the lab's policies and objectives for quality of testing services are documented in the Quality Manual. The Technical Director shall assure that the Quality Manual is communicated to, understood, and implemented by all personnel concerned. Documentation includes signed statements in each analyst's training file.

B. Quality Assurance Officer (QA Officer)-

- Has responsibility for the quality system and its implementation. The QA Officer is one of the partners of EcoTest and has direct access to the Technical Director who is the other partner.

- Serves as the focal point for QA/QC and be responsible for the oversight and/or review of quality control data.

- Has functions independent from laboratory operations for which they have quality assurance oversight.

- Must be able to evaluate objectively and perform assessments without outside influence.

- Has documented training and/or experience in QA/QC procedures and knowledgeable in the quality system as defined under NELAC.

- Has a general knowledge of the analytical test methods for which data review is performed.

- Arranges for or conducts internal audits of the technical operations for designated departments annually.

- Shall discuss deficiencies in the quality system with Technical Director and department supervisor(s) and monitor corrective action.

C. Department Supervisors-

There are laboratory supervisors assigned to different areas of the lab: Inorganics (Metals & Wet Chemical Analysis), Volatile Organics Analysis, Semi-Volatile Organics Analysis by GCMS, Semi-Volatile Organics by GC(ECD & FID) and Microbiology. The duties of lab supervisors include:

- Training of technicians in general laboratory procedures, analytical methods and quality control procedures.

- Communicating with Technical Director and QA Officer and analysts to insure that analysis is carried out property.

- Resolving any problems involving analytical procedures that may arise. Problems that cannot be resolved at this level are brought to the attention of the Technical Director or QA Officer for further attempts at resolution.

D. Sample Manager- Duties include:

- Receipt of samples and Chain of Custody forms and any other documentation such as shipping records.
- Recording type and condition of sample containers, preservatives used, condition of custody seal if used, sample temperature.
- Check sample tags and/or labels against Chain of Custody forms for agreement and recording of discrepancies.
- Logging-in of samples consisting of recording pertinent information in logbook and filing of associated documentation such as Chain of Custody forms.
- Contact clients when there are questions regarding samples or when sample preservation, storage and shipping conditions, containers or other factors may have compromised the samples.
- Distribution of samples to appropriate storage shelves or refrigerators.
- Removal of completed samples to special storage room where inactive samples are held pending disposal. At appropriate time, sample manager oversees disposal of samples.

E. Laboratory Technicians - Duties Include:

- Perform analysis and report results of samples.
- Responsible for complying with all quality requirements that pertain to the analysis performed.

- Assist Supervisors, QA Officer and Technical Director in the training of other technicians.

5. DOCUMENT CONTROL

All operating procedures, manuals including this quality manual, and documents, are subject to document control. Distribution of controlled documents is limited to those indicated on the document distribution list. Controlled documents produced by the laboratory such as Quality Manual and SOPs are indicated by the blue "ORIGINAL" stamp on each page. Other controlled documents such as methods publications and instrument manuals are stamped "CONTROLLED DOCUMENT" in red on cover. The QA Officer keeps a master list of distributed documents. Each and every copy of the Quality Manual and SOPs is signed for by each individual when distributed or returned. Other controlled documents such as methods publications and instrument manuals (those stamped with red stamp) are listed on the master document list under the control of the QA Officer.

The purpose of the document control system is to ensure that only the most recent revisions are available to the appropriate personnel, revisions are timely, and receive the required approvals. All internal regulatory documentation, standard operating procedures, work instructions, service manuals, and product instructions are under document control. The QA Officer is responsible for the document control system and keeps a master list of the location of all documents and their current revision. The Technical Director and the QA Officer approve all newly released documents and revised documents. Any employee can request a change to a document. Where necessary, obsolete documents may be retained for legal reasons or for knowledge preservation. The Quality Assurance Officer stores retained obsolete documents. Each page of documents produced by the laboratory will contain the effective date, revision number, Document number, and Document title. Controlled documents will have an approval signature page, a revision (change record) history page, and a distribution list.

All SOPs and internal controlled documents are reviewed once per year. If a document is revised during the year the revision record in the document shall demonstrate review. If a document has not been revised during the

year, the review record shall be the signature of the person responsible for the document and the date of the review. Amendment of documents is not allowed pending formal re-issue.

All data, including original observations, calculations and derived data, calibration records, QC records, and copies of the test reports, resulting from the analyses of samples are recorded and kept for five years (ten years for potable water samples) to allow historical reconstruction of the final result.

6. TRACEABILITY OF MEASUREMENTS

Verification and/or validation of equipment, such as, balances, thermometers, and spectrophotometers, shall be performed with National Institute of Standards and Technology (NIST) traceable standards.

Calibration certificates must indicate NIST Traceability along with measurement results and the associated uncertainty and/or a statement of compliance with an identified metrological specification, such as tolerance.

Reference standards, such as Class S weights and NIST traceable thermometers, are used for calibration only and shall be calibrated by an organization that can provide traceability to NIST.

Traceability to national standards of measurement is not applicable to the BOD, pH, and Fecal Coliform tests, therefore, EcoTest Lab's participation in the NIST accredited New York State ELAP proficiency testing program or other NELAC accredited proficiency testing program provides satisfactory evidence of correlation of results.

Volumetric glassware, if not serialized and calibrated by the manufacturer or Class A, is checked quarterly in-house using a documented gravimetric technique.

7. REVIEW OF ALL REQUESTS, TENDERS AND CONTRACTS

All new work is initiated by the Technical Director who delegates responsibilities for the new work according to available resources. Staff meets prior to initiation of new work if the size of the project merits it, in order to determine if appropriate facilities and resources are available. The plan for any new testing shall be reviewed and approved by the Technical Director before commencing such work.

The review shall document that facilities and resources are organized to efficiently perform the work, including subcontracted work. The record of contract review includes pertinent discussions with the client regarding their requirements and results submitted during the contract period. For routine reviews of ongoing work a date and a signature of the laboratory official responsible for the contract is sufficient. For any new testing requirements, the designated official shall ensure that standard operating procedures and demonstration of capability to perform those tests prior to reporting results are available. The SOP(s) shall be under document control and a Demonstration of Capability statement(s) shall be on file. Copies are held in the contract review file.

If the review uncovers any potential conflicts, deficiencies, inappropriate accreditation status, and/or inability to perform the work, the laboratory shall notify the client. In cases where differences exist between the request/tender and contract they shall be resolved prior to starting work.

Clients are notified immediately in situations where the laboratory cannot conform to the contract and if the there is a change in laboratory accreditation status.

8. CALIBRATION/VERIFICATION OF TEST PROCEDURES.

A. Calibration and/or verification procedures are designed to ensure that the data will be of known quality and be appropriate for a given regulation or decision. Details of instrument calibration and/or test verification

procedures including calibration range, standardizations, calculations and acceptance criteria are included or referenced in each test method SOP.

B. Sufficient raw data are retained to reconstruct the calibration used to calculate the sample result.

C. All calibrations are verified with a second source standard which is traceable to a national standard, when available.

D. Calibration standards include a concentration at or below the regulatory/decision level but above the laboratory's detection limit.

E. Results of samples must be within the calibration range (bracketed by standards) or the results must be flagged as having less certainty.

F. No data associated with a calibration that is out-of-control will be reported unless it is flagged and client is notified.

G. Method Detection Limits (MDL): The MDL (aka Limit of Detection (LOD)) has been determined by the laboratory and documented for each analyte where spiking solutions are available when required by the published method. MDL can be determined by the procedure presented in 4O CFR Part 136, Appendix B. All sample processing steps of the analytical method are included in the determination of MDL. The standard deviation of the analysis of seven portions of spiked reagent water is calculated. The spiked reagent water is at an estimated concentration between the actual MDL and 5 times the actual MDL. The MDL is the product of 3.14 times the calculated standard deviation. The MDL should be about one fifth of the practical and routinely achievable level that can be reported with relatively good certainty that any reported value is reliable. Detection limits for BOD and TSS are defined by the method. MDLs are included in the Methods Manual for each method if required by the method. If MDL's are not required by the official method, and the MDLs are not determined, no result is reported that is outside the calibration range.

H. Laboratory Reporting Limit (LRL) (aka Limit of Quantification (LOQ)) is determined for each analyte and matrix in a method. The LRL always greater than or equal to the MDL. The LRL is established by analyzing standards that produce a result that is clearly distinguishable from the method blank. A standard is then run with each batch at the LRL for all instrumental methods such as GC, ICP, AA, IR and HPLC. For

colorimetric wet chemical methods, the LRL is evaluated each time a curve is produced. Other methods such as pH, BOD and gravimetric methods such as TSS are determined by the method.

9. SAMPLE HANDLING

A. Sample Acceptance Policy - When EcoTest is required to collect samples, designated employees, trained as sample collectors are utilized. Collection is performed using approved plastic or glass containers of sufficient volume containing the necessary preservatives and chlorine neutralizing agents. Microbiological samples are collected in sterile containers. Samples that have not been properly stored during transport to the laboratory shall not be accepted or data must be flagged and client's permission must be obtained. Containers that are found at receipt to be compromised, either cracked or leaking, will not be accepted. Each sample container will be uniquely identified using a durable (water-resistant) label. The source (job name or location), site ID, along with the collection date, and time will be used to mark the samples submitted. Samples that require holding at 4 - 6 ^{o}C and which are hand delivered to the laboratory immediately after collection must be transported on ice in order to demonstrate that the chilling process has begun. The sample acceptance policy is available to the sample collectors. If any samples do not meet any requirements of the acceptance policy, the samples are not accepted for testing and resampling is requested unless client agrees to the exception and data is flagged.

Obtaining sample aliquots from a submitted sample as part of the test method is carried out using procedures as written in each method SOP. Appropriate techniques to obtain representative subsamples are employed and documented in the method SOP.

The samples must be submitted to the laboratory with records of field ID, location, date and time of collection, collector's name, preservation, sample type, and remarks. Complete preservation and handling instructions are furnished to the sample collectors.

Summary of Sampling and Handling Requirements: copies of tables from New York State ELAP Manual are included as APPENDIX D.

B. Sample Receipt Protocol - Upon receipt, the condition of the samples, including all items specified in the sample acceptance policy, are checked and recorded. Samples with a temperature of just above freezing to 6°C are acceptable if 4°C is specified. Samples that have not had time to cool are acceptable if they arrive on ice and cooling has begun. Dechlorinated samples are acceptable if the chemical test yields no free chlorine detected. Acid-preserved samples are acceptable if test with pH paper or pH meter yields a result of <2. All exceptions to the sample receipt protocol are fully documented. Sample records are linked to the sample ID and include all required information specified by the sample acceptance policy.

C. Procedures for handling submitted samples . Samples are stored according to conditions specified in each test SOP. The laboratory has documented procedures and appropriate facilities to avoid deterioration, contamination, or damage to samples during storage, handling, preparation, and testing. Storage conditions are maintained, monitored, and recorded.

Additional procedures for handling submitted samples:

I). Obtaining sample aliquots from a submitted sample as part of the test method is carried out using procedures as written in each method SOP. Appropriate techniques to obtain representative subsamples are employed.

2). Each sample container will be uniquely identified using a durable label. For this laboratory, the field code or site ID along with the collection date will be used to mark the samples submitted.

3). The sample acceptance policy is documented and available to the sample collectors. If any samples do not meet any requirements of the acceptance policy, the data is flagged in an unambiguous manner clearly defining the nature and substance of the variation.

4). The sample receipt protocol is documented. The condition of the

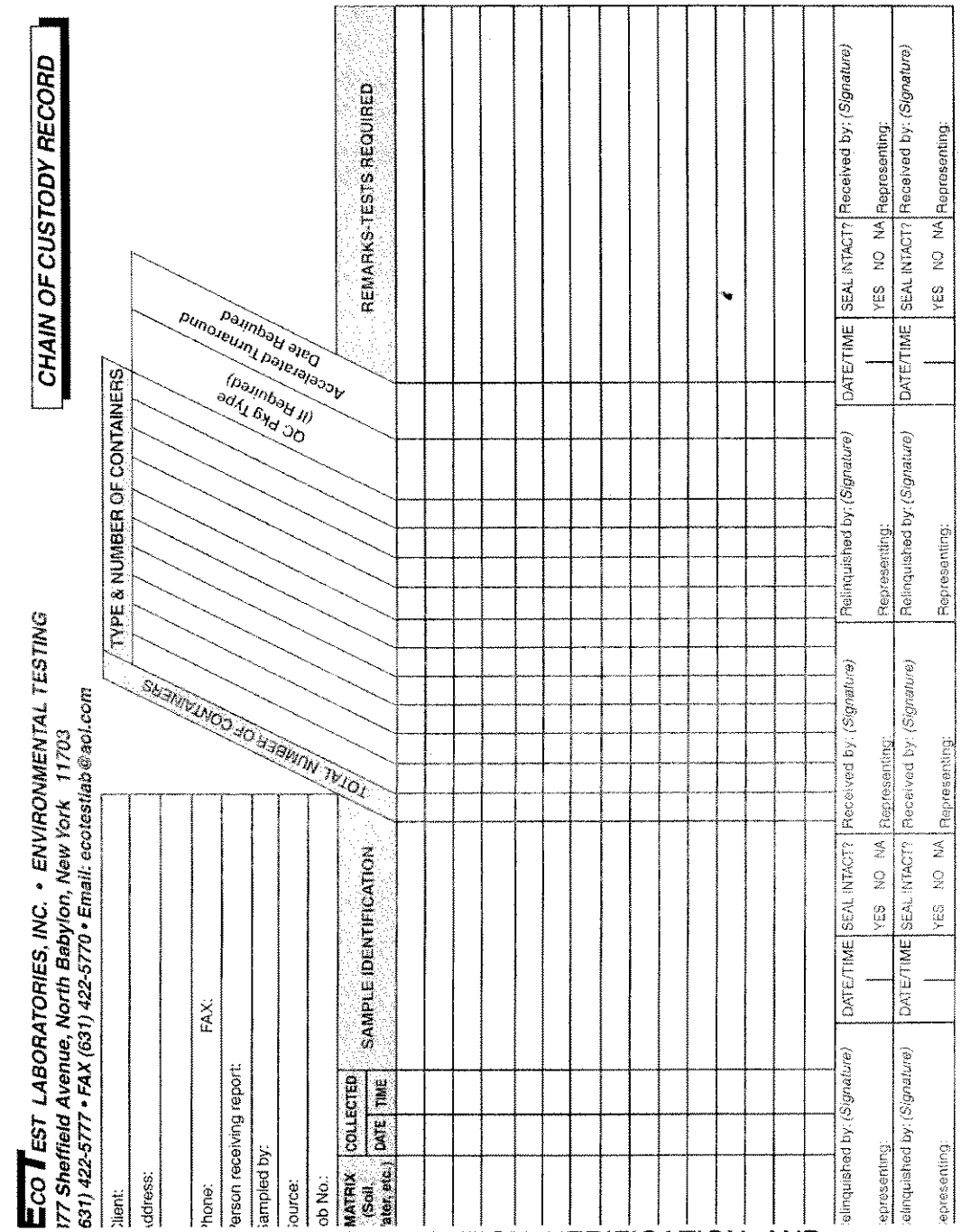
sample, including any abnormalities or departures from standard-condition as prescribed in the relevant test method, is recorded. Chain-of-Custody forms are employed whenever practicable.

5). Receipt of all samples is recorded in a permanent chronological record, or logbook. The logbook contains project name, date and time of laboratory receipt, laboratory ID, initials of recorder.

6). Sample records which are also available and linked to the sample ID include all required information specified by the sample acceptance policy.

7). Samples are stored according to conditions specified in each test SOP. The laboratory has documented procedures and appropriate facilities to avoid deterioration, contamination, or damage to samples during storage, handling, preparation, and testing. Storage conditions are maintained, monitored, and recorded where necessary.

D. Copy of Chain of Custody Form:



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CHAIN OF CUSTODY RECORD

Client:
Address:
Phone: FAX:
Person receiving report:
Sampled by:
Source:
Job No.:

MATRIX (Soil, Water, etc.)	COLLECTED DATE	COLLECTED TIME	SAMPLE IDENTIFICATION

TOTAL NUMBER OF CONTAINERS
TYPE & NUMBER OF CONTAINERS
QC Pkg Type (If Required)
Accelerated Turnaround Date Required
REMARKS-TESTS REQUIRED

Relinquished by: (Signature) DATE/TIME SEAL INTACT? YES NO NA Received by: (Signature)
Representing: Representing:

Relinquished by: (Signature) DATE/TIME SEAL INTACT? YES NO NA Received by: (Signature)
Representing: Representing:

Relinquished by: (Signature) DATE/TIME SEAL INTACT? YES NO NA Received by: (Signature)
Representing: Representing:

10. PROCEDURES FOR CALIBRATION, VERIFICATION, AND

MAINTENANCE OF EQUIPMENT

NOTE: SEE APPENDIX F FOR LIST OF EQUIPMENT.

A. Calibration and testing occur only within the laboratory, designed, built and maintained as laboratory space. The laboratory space is maintained and monitored by the staff to the specifications required for laboratory space. The specification for temperature is (70'F +/- 3'F); for humidity (45% RH +/- 5%); and for voltage (120V +/- 2%). Electronic balances are located away from drafts and doorways and mounted on stone top counters in areas where their use could be affected by vibrations. Neighboring test areas of incompatible activities are effectively separated. Specific work areas are defined and access is controlled. (Only authorized laboratory personnel and escorted, signed-in visitors may enter the work area.) Good housekeeping measures are employed to avoid the possibility of contamination. (Smoking and eating are prohibited in the laboratory.)

B. All equipment and reference materials required for the accredited tests are available in the laboratory. Records are maintained for all equipment, reference measurement materials, and services used by the laboratory.

C. Reference materials traceable to national standards of measurement or to national standard reference materials are stored away from heavy use areas or major equipment that may effect the proper operation of the materials. Certificates of Traceability are available for the reference thermometer and the Class S weights. The reference materials are used only for calibration to maintain the validity of performance.

D. Equipment is maintained, inspected, and cleaned according to the written Equipment Maintenance Procedures. Any defective item of equipment is clearly marked and taken out of service until it has been shown to perform satisfactorily.

E. Each item of equipment or reference material is labeled to show its calibration status.

F. Equipment and reference material records include:

1) Name of item of equipment or reference material.
2) Manufacturer, identification, serial number.
3) Date received and placed in service.
4) Current location.
5) Condition when received.
6) Copy of manufacturer's instructions or manuals.
7) Dates and results of calibrations/verifications and date of next calibration/verification.
8) Details of maintenance carried out to date and planned for the future.
9) History of any damage, malfunction, modification, or repair.

G. Support equipment calibrations are verified annually using NIST traceable references over the range of use. Balances, ovens, refrigerators, freezers, incubators, and water baths are checked with NIST traceable references (where possible) daily and recorded. Additional monitoring as prescribed by the test method SOP is recorded. Mechanical volumetric dispensing devices are checked for accuracy quarterly and recorded. Autoclave cycles of chemical tests (digestions) are recorded by use of chemical indicators or temperature recorder and pressure gauge. The sterilization temperature, cycle time, and pressure of each autoclave run for biological tests are recorded. Monthly use of spore strips demonstrate sterilization. Autoclave tape is only used to indicate that each batch has been exposed to the sterilization process.

H. Service of equipment is performed by qualified service organizations. All records and certificates from service calls are retained.

11. PROFICIENCY TESTING PARTICIPATION, INTERLABORATORY COMPARISONS, USE OF REFERENCE MATERIALS

A. The laboratory reports its participation in an accredited proficiency testing program for each category of ELAP approval semi-annually. ELAP PT studies may be used. The results are used to evaluate the ability of the laboratory to produce accurate data. Proficiency test reports along with all raw data necessary to reconstruct the analyses are retained at the laboratory. The laboratory does not participate in interlaboratory comparisons for a given method unless required by NYSDOH ELAP.

B. The laboratory purchases external reference samples. All reference samples are certified. The laboratory retains the manufacturer's Certificate of Analysis.

12. INTERNAL QUALITY CONTROL PROCEDURES

The data acquired from quality control (QC) procedures are used to estimate the quality of analytical data, to determine the need for corrective action, and to interpret results after corrective actions are implemented. Each method standard operating procedure (SOP) includes detailed QC procedures and QC limits or procedures for establishing QC limits. QC limits are generated where no method limits exist. QC limits for laboratory control samples (LCS) and matrix spikes (MS) are based on the historical mean recovery plus or minus three standard deviations units. Duplicate limits for precision range from zero to 3.27 times the mean of the historical differences or relative percent differences. (In cases where historical data is not available, interim QC limits will be used until 20 data points are available to calculate QC limits. Interim QC limits for LCS and MS will be 80% - 120% recovery. Interim QC limits for duplicates will be 20% relative percent difference.)

All quality control measures are assessed and evaluated on an on-going

basis. EcoTest chooses to present results of LCS and Matrix Spikes on control charts for on-going and trend evaluation. Results of Laboratory Duplicate analyses are also presented control charts for on-going evaluation. Analytical data generated with QC samples that fall within prescribed acceptance limits indicate the test method was in control. Data generated with QC samples that fall outside QC limits indicate the test method was out of control . These data are considered suspect. Typically the corresponding samples are reanalyzed or reported with qualifiers if reanalysis is not possible. If the cause of the exceedance can be clearly shown to be the result of the interferences or characteristics of the particular sample chosen, reanalysis is not required but the results must be flagged. For example if a sample that is spiked requires dilution in order for analyte(s) to be within linear range, it may be the case that the spike is "diluted out" meaning it is not distinguishable because of high dilution of the spike added. In such a case the analysis is not redone and the data is flagged.

Method Blanks are performed at a frequency of one per batch of twenty or fewer samples for all analytes with the exception of analytes such as pH where blanks are not applicable. The results are used to determine batch acceptance. When blanks exceed the method SOP limits, the source of the contamination is investigated and measures are taken to correct, minimize and eliminate the problem.

Laboratory Control Samples (LCS), also referred to as Reference Samples, are performed at a frequency of one per batch of twenty or fewer samples for all analytes. The results are used to determine batch acceptance.

Matrix spikes are performed at a frequency of one per twenty samples for all analytes with the exception of analytes such as pH and Total Suspended Solids where matrix spikes are not applicable. The results are used to determine the existence of matrix effects in the spike sample. A matrix effect is indicated if the LCS data are within QC limits but the matrix spike data exceed QC limits.

Laboratory duplicates are performed at a frequency of one per twenty samples for all analytes. Duplicates are a measure of precision. If a duplicate result falls outside QC limits the original sample and the duplicate sample data is regarded as unreliable. If however the cause of the exceedance can be clearly shown to be the result of the interferences or characteristics of the particular sample chosen, reanalysis is not required but the results must be flagged. For example if a sample that is spiked requires dilution in order for analyte(s) to be within linear range, it may be the case that the spike is "diluted out" meaning it is not distinguishable because of high dilution of the spike added. In such a case the analysis is not redone and the data is flagged.

13. CONTROL OF NON-CONFORMING ENVIRONMENTAL TESTING

Specific corrective action protocols for handling out-of-control QC are in each method SOP of the Methods Manual. In addition, general procedures are followed to determine when departures from quality control have occurred. Provision is made for such deviations and documentation is determined by the Corrective Action Procedure. Because of the sampling schedule and the time frame of the analysis it is not always possible to repeat the analysis if all quality control measures are not found acceptable. Therefore, if a quality control measure is found to be out-of-control, and the data is to be reported, all samples associated with the failed quality control measure are reported with the appropriate data qualifier.

14. CORRECTIVE ACTION PROCEDURE

Corrective action is the process of identifying, recommending, approving, and implementing measures to counter unacceptable departures from policies and procedures or out of control QC performance which can affect data quality.

Deficiencies cited in the external assessment (ELAP inspection), internal quality audit, complaints, and managerial review are documented. Records shall be available to show that the root cause(s) of the deficiencies are investigated, including the results of the investigation. Records shall be available to document the intended corrective action. Records shall be available to show that the implemented corrective action is monitored for effectiveness. The Quality Assurance Officer maintains these records. The Technical Director will ensure that the corrective actions are discharged within the agreed upon time frame. When non-conformances and departures from SOPs cause doubt about the laboratory's operations the affected areas are promptly audited.

Method SOPs provide QC acceptance criteria and specific protocols for corrective actions. Any QC measure result that falls outside of acceptance limits requires corrective action. When testing discrepancies are detected such as out-of-control QC, the analyst will follow the specific protocol for corrective action as stated in the method SOP located in the Methods Manual. In addition, any discrepancies are documented in the Corrective Action Log maintained in the laboratory. The discrepancy will be identified, and the sample data associated with the discrepancy will be flagged. The Quality Assurance Officer will recommend corrective actions to be initiated by the analyst and ensure implementation and documentation of the corrective action. Each corrective action log entry is reviewed, signed, and dated by the Quality Assurance Officer and the Technical Director. If possible, corrective actions are performed prior to the reporting of the effected data. If not, the data must be flagged accordingly.

15. EXCEPTIONALLY PERMITTED DEPARTURES FROM DOCUMENTED POLICIES AND PROCEDURES OR FROM STANDARD SPECIFICATIONS.

The Technical Director has responsibility for ensuring the lab's policies and procedures are adhered to. Arrangements for known and controlled departures from documented policies and procedures are allowed. Planned departures do not require audits, however, the departure will be fully documented and included the reason for the departure, the effected SOP(s), the intended results of the departure and the actual results. If the data reported to the client is effected adversely, it will be notified in writing. The Quality Assurance Officer or Technical Director must approve the departures. The procedures used to document any specific departure is the same as the corrective action procedure.

16. PREVENTIVE ACTION

Preventive action is the pro-active process to identify opportunities for improvement rather than a reaction to the identification of problems or complaints.

All employees have the authority to recommend preventive action. Recommendations are made to the Quality Assurance Officer if warranted, the Quality Assurance Officer develops an action plan to develop, implement and monitor the action. The plan must include controls that will enable objective evaluation of it's suitability. The preventive action is audited under the direction of the Quality Assurance Officer.

17. COMPLAINTS

All complaints about the laboratory's activities received from clients or other parties will be documented in a complaint file maintained in the laboratory. The file will contain the date and name of the person receiving the complaint, a description of the complaint, source of the complaint, the resolution, and any written material accompanying the complaint.

The Quality Assurance Officer investigates complaints and promptly audits all areas of activity and responsibility involved. The written results of the investigation including actions taken by the laboratory are reviewed by the Technical Director. The results of the investigation are signed and dated by the Technical Director and the Quality Assurance Officer.

18. INTERNAL AUDIT AND DATA REVIEW

A. Data Review - All data, including original observations, calculations and derived data, calibration records, QC records, and a copy of the test report, resulting from the analyses of samples are recorded and kept for five years (ten years for public water supplies) to allow historical reconstruction of the final result. All results are reviewed and evaluated by a second analyst or the Quality Assurance Officer before it is reported. Errors detected in the review process are referred to the analyst for corrective action. The Quality Assurance Officer assures that all errors found in the review process are documented along with the corrective action.

Each calendar quarter, the Quality Assurance Officer or his designee shall audit 5% or 5 data packages, whichever is more. The purpose of the review is to verify that all data integrity requirements are met.

B. Internal Quality System Audits - The Quality Assurance Officer will arrange for an internal quality system review annually. The audit will be carried out by trained personnel who are independent (if possible) of the activity being audited. The Quality Assurance Officer will review the requirements of the ELAP manual against laboratory operations, and laboratory operations against the laboratory Quality Manual and SOPS. The results of the audits will be documented in writing. Where audit findings cast doubt on the validity or correctness of the data, the lab will take immediate corrective action. Any corrective actions will be documented. The Technical Director will ensure that the corrective-actions are discharged within the agreed-upon time frame. Any client whose work was possibly adversely affected shall be notified in writing. Documented reviews are performed with respect to any evidence of inappropriate actions or vulnerabilities related to data integrity. Allegations are confidentially investigated. All investigations that result in findings of inappropriate activity are documented and shall include any disciplinary actions involved, corrective actions taken, and all appropriate notifications to clients. Documentation is maintained for five years.

C. Managerial Review - The Laboratory Director shall review the laboratory quality system and its testing and calibration activities annually to introduce any necessary changes or improvements. The review will be take into account the outcome of recent internal audits, assessments by external bodies (NYSDOH-ELAP, EcoTest's primary accrediting authority, NYS DEC, USEPA or clients), the results of interlaboratory comparisons, the results of ELAP proficiency tests, any changes in the volume and type of work undertaken, feedback from clients or regulatory agencies and corrective and preventive actions. The findings and any corrective actions from this review will be documented.

19. TRAINING AND REVIEW OF PERSONNEL QUALIFICATIONS

Laboratory management reviews an applicant's level of qualification, experience, and skills against the laboratory's job description requirements before assigning an employee to the laboratory. Each analyst has adequate experience and education to demonstrate specific knowledge of their function and a general knowledge of laboratory operations, test methods, QC procedures, and records management..

New hires performing analytical work will be required to have earned a minimum of an associates degree in a scientific field. In order to perform a test that is new to the employee there must be a training period in which the trainee works with an experienced technician or supervisor until the trainer is satisfied that the trainee is able to perform the test with limited supervision. The trainee is required to take notes while being trained and to carefully read the SOP for the method. The training period will vary depending on the complexity of the test and it is the responsibility of the trainer to continue to assist the trainee and decide when he/she can perform the test independently.

The Technical Director or Quality Assurance Officer will keep the following personnel records:

A. The laboratory will maintain a training, file which contains:

1. A statement from each employee that they have read, understood, and are using the latest version of the laboratory Quality Manual and SOPS. The statement will be signed and dated.

2. A statement from each employee that they have read, acknowledged and understood their personal ethical and legal responsibilities including the potential punishments and penalties for improper, unethical or illegal actions. The statement will be signed and dated.

3. A Demonstration of Capability (DOC) for each employee for each accredited method.

4. Documentation of any training courses, seminars, and/or workshops

5. Documentation of each employee's continued proficiency to perform each test method by one of the following annually:

i. acceptable performance of a blind sample (single blind to the analyst) for each accredited method;

ii. another Demonstration of Capability;

iii at least four consecutive Laboratory Control Samples with acceptable levels of precision and accuracy;

iv. if i - iv cannot be performed, analysis of authentic samples that have been analyzed by another trained analyst with statistically indistinguishable results.

B. Demonstration of Capability (DOC) - A DOC must be performed prior to using any test method, and any time there is a change in instrument type, personnel, or method. The procedure will follow ELAP Certification Manual Item 233, and the DOC Certificate included therein is completed for each analyst for each accredited method. EcoTest Labs, through QC charting, has historical data adequately demonstrating analysts' capability to meet the laboratory-generated acceptance criteria. Where the analyst has demonstrated capability through analysis and QC charting, of Laboratory Control Samples with acceptable results, the procedure for demonstrating continued proficiency to perform the test method (above) will be used for the DOC Certification Statement.

20. DATA INTEGRITY & ETHICS

Data Integrity/Ethics training shall occur for each employee required to perform laboratory testing either at the initial hiring orientation or within two weeks after assignment to laboratory functions. Annual training is also required for all employees. Training may be conducted in-house or externally. A record of training and a signed attestation by the trained employee shall be placed in the employee□s training file.

Topics covered are documented in writing and provided to all trainees. Key topics covered are the organizational mission and its relationship to the critical need for honesty and full disclosure in all analytical reporting, how and when to report data integrity issues and record keeping. Training includes discussion regarding all data integrity procedures, data integrity training documentation, in-depth data monitoring and data integrity procedure documentation. Trainees are required to understand that any infractions of the laboratory data integrity procedures will result in a detailed investigation that could lead to very serious consequences including immediate termination, or civil/criminal prosecution.

The initial and annual refresher data integrity training shall have a signature attendance sheet that demonstrates all staff have participated and understand their obligation related to data integrity/ethics. Specific examples of breaches of ethical behavior should be discussed including improper data manipulations, adjustments of instrument time clocks, and inappropriate changes in concentrations of standards. Data integrity training requires emphasis on the importance of proper written narration on the part of the analyst with respect to those cases where analytical data may be useful, but are in one sense or another partially deficient.

Senior managers/department heads acknowledge their support of these procedures by upholding the spirit and intent of the laboratory's data integrity procedures and effectively implement the specific requirements of the procedures. See Appendix A.